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Contents

Articles

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Compounding Ingredients[1]

Compositions—Properties—Functions

THE general use of accelerators of vulcanization in rubber compounding practice was succeeded by the introduction of antioxidants for preserving rubber articles against the well-known destructive effect of oxygen on the life of vulcanized rubber articles. Antioxidants, or retarders, are of several types, according as they severally inhibit static oxidation, flex cracking, sun-checking, or reversion of cure. A universal age retarder protecting rubber against all forms of deterioration and free from all objections has not yet been discovered. In practice one selects that antioxidant which will give the special protection necessary for the service requirements of the goods. The following descriptive list includes the antioxidants well established in rubber practice.

Rubber Chemicals—Antioxidants

Age-Rite Gel

CHEMICAL COMPOSITION. Ditolylamines with a selected petroleum wax.
SELLER. R. T. Vanderbilt Co.
APPLICATIONS. Suitable antioxidant in all stocks.
PHYSICAL STATE. Grayish-white soft waxy solid.
PROPERTIES. Sp. gr., 1.01. M. p., about 65° C. (149° F.). Insoluble in water; somewhat soluble in gasoline; easily soluble in benzene and carbon disulphide. Odor faint like that of ditolylamines. Non-toxic. Disperses readily.
PURPOSE AND FUNCTION. Tends to prevent sun checking, flex cracking, heat deterioration, reversion, and static oxidation. Discoloration in sunlight is less than that of Age-Rite Resin, Powder, or White. Acts as a softener. Does not stiffen cold stocks. Does not bloom from cured or uncured stocks.
METHODS OF USE. Add directly to rubber. Amounts recommended 1 to 2% on the rubber.
VULCANIZATION. Slightly activates cure with Captax, Altax, Tuads, Zimate in pure gum. Negligible with all other accelerators.
PATENTS. Not disclosed.

Age-Rite HP

CHEMICAL COMPOSITION. Mixture of secondary aromatic amines.
SELLER. R. T. Vanderbilt Co.
APPLICATIONS. For high carbon stocks such as tire treads, belt covers, footwear, molded soles, heavy duty inner tubes, steam packing, insulated wire, and any other composition subjected to high temperature in service.
PHYSICAL STATE. Non-caking dark gray powder.
PROPERTIES. Sp. gr., 1.20. M. p., below 100° C. (212° F.). Insoluble in water; somewhat soluble in gasoline; easily soluble in benzene and carbon disulphide. Odor faint; none in rubber stocks. Stable. Non-toxic. Stocks exposed to sunlight turn brown. Disperses readily. Blooms from cured or uncured stock if used to over 1.5% on the rubber.
PURPOSE AND FUNCTION. Greatly reduces flexure cracking. Is a high powered age resister comparable to Age-Rite White in activity. Allows more gas black to be used in abrasion resistant stocks without increasing flexure cracking and enables rubber stocks to resist the deteriorating effects which occur at high temperatures.
METHODS OF USE. Add directly to the rubber. For gas black stocks up to 1.5% on the rubber may be used with increasingly beneficial results. The amount recommended for tire treads is 1.25%.
VULCANIZATION. Has no greater effect on rate of cure than Age-Rite Powder and can be used in any type of compound whether with low or normal sulphur ratios.
PATENTS. Not disclosed.

Age-Rite Powder

CHEMICAL COMPOSITION. Phenyl-beta-naphthylamine.
SELLER. R. T. Vanderbilt Co.
APPLICATIONS. Tire treads, inner tubes, insulated wire, various mechanicals, and footwear.
PHYSICAL STATE. Free flowing light gray powder.
PROPERTIES. Sp. gr., 1.19. M. p., 106-107° C. (222.8 to 224.6° F.). Insoluble in water; sparingly soluble in gasoline and alcohol; easily soluble in benzene and carbon disulphide. Odor very faint; none in rubber stocks. Non-toxic. Disperses readily in hot rubber.
PURPOSE AND FUNCTION. Tends to prevent flex cracking, static oxidation, reversion, and heat deterioration. Stocks exposed to sunlight turn brown. Blooms from cured or uncured stocks if used to over 2% on the rubber. Very little effect on plasticity during mixing or after cooling.
METHODS OF USE. Add directly to rubber. Amounts recommended 1 to 2% on the rubber.
VULCANIZATION. Negligible effect with all accelerators.
PATENTS. Not disclosed.

Age-Rite Resin

CHEMICAL COMPOSITION. Aldol-alpha-naphthylamine.
SELLER. R. T. Vanderbilt Co.
APPLICATIONS. General utility antioxidant recommended in pure gum stocks, tire carcass, tubes, uncured tape, and black soles.

[1] Continued from INDIA RUBBER WORLD, Feb. 1, 1935, pp. 27-32.

PHYSICAL STATE. Cherry red resin.
PROPERTIES. Sp. gr., 1.16. M. p., softens on warming, flows freely at 80 to 100° C. (176 to 212° F.). Insoluble in water; sparingly soluble in gasoline; easily soluble in benzene, alcohol, and chloroform. Odor characteristic of alpha-naphthylamine. Non-toxic. Disperses readily.
PURPOSE AND FUNCTION. Tends to prevent reversion, heat deterioration, and static oxidation. Stocks exposed to sunlight turn brown. Does not bloom from cured or uncured stocks. Increases tack of warm stocks. Stiffens cold stocks slightly.
METHODS OF USE. Add directly to rubber. Amounts recommended 0.5 to 1% on the rubber. For high temperature resistance up to 5%.
VULCANIZATION. Activating effect negligible with amine-type accelerators. Distinct with Captax, Altax, Tuads, and Zimate in pure gum.
PATENTS. Not disclosed.

Age-Rite White

CHEMICAL COMPOSITION. Sym. di-beta-naphthyl-para-phenylenediamine.
SELLER. R. T. Vanderbilt Co.
APPLICATIONS. Threads and bands, bathing caps, pure gum and stocks containing factice, rubberized fabrics, and acid cured stocks.
PHYSICAL STATE. Non-caking grayish-white powder.
PROPERTIES. Sp. gr., 1.20. M. p., 230 to 235° C. (446 to 455° F.). Insoluble in water; very slightly soluble in alcohol and gasoline; moderately soluble in benzene, acetone, and carbon disulphide. Odor very faint; none in rubber stocks. Non-toxic. Disperses satisfactorily if carefully added. Should be master batched.
PURPOSE AND FUNCTION. Tends to prevent copper poisoning, reversion, static oxidation, and acid cure deterioration. Stocks exposed to sunlight turn gray. Does not bloom from cured or uncured stocks. Has no effect on plasticity.
METHODS OF USE. Add in master batching recommended. Amounts recommended 0.25 to 1% on the rubber.
VULCANIZATION. Negligible effect with all accelerators.
PATENTS. Not disclosed.

Akroflex A

CHEMICAL COMPOSITION. Mixture of secondary aromatic amines.
SELLER. E. I. du Pont de Nemours & Co., Inc.
APPLICATIONS. Especially good for tires and any dark colored product where good aging, flex cracking, and heat resistance are required.
PHYSICAL STATE. Brownish-black waxy material.
PROPERTIES. Sp. gr., 1.18. Melting range, 95° to 105° C. (203° to 221° F.). No odor in cured rubber. Very stable in storage. Disperses readily. Blooming tendency if used in excess of 1.25% on the rubber. Antioxidant properties equivalent to Neozone D by oxygen bomb test. Better heat resistance than Neozone D by Geer oven and air bomb tests. Definitely superior to the Neozones in providing resistance to flex cracking.
PURPOSE AND FUNCTION. Provides especially good aging, flex cracking, and heat resistance. Discolors rubber on exposure to light. Has no marked stiffening or softening effect on cured or uncured rubber.
METHODS OF USE. Add directly to rubber. Recommend using 0.75% on rubber, but never over 1%.
VULCANIZATION. Has no effect on rate of cure.
PATENTS. U. S. No. 1,781,306.

Akroflex B

CHEMICAL COMPOSITION. Mixture of secondary amines.
SELLER. E. I. du Pont de Nemours & Co., Inc.
APPLICATIONS. Tires, inner tubes, and any stocks where exceptional resistance to heat and flex cracking are required.
PHYSICAL STATE. A brown thixotropic fluid at 70° F.
PROPERTIES. Sp. gr., 1.18. Soluble in rubber. No odor in cured rubber. Stable. Non-toxic. Disperses very readily. Blooming tendency if used in excess of 2% on rubber. Antioxidant properties at least equal to Neozone D by oxygen bomb test. Gives much better heat and flex cracking resistance than the Neozones.
PURPOSE AND FUNCTION. Provides excellent antioxidant properties, heat and flex cracking resistance. Discolors rubber on exposure to light. Slightly softens uncured stocks, but does not affect cured rubber.
METHODS OF USE. Add directly to rubber. Recommend using 1 to 1.25% on the rubber.
VULCANIZATION. Has no effect on rate of cure.
PATENTS. U. S. No. 1,781,306.

Akroflex C

CHEMICAL COMPOSITION. Mixture of secondary amines consisting principally of phenyl alpha naphthylamine and diphenyl-para-phenylene diamine.
SELLER. E. I. du Pont de Nemours & Co., Inc.
APPLICATIONS. Tires, belting, and any dark rubber product where good aging and resistance to heat and flex cracking are required.
PHYSICAL STATE. Brownish waxy material.
PROPERTIES. Sp. gr., 1.18. Melting range, 60 to 80° C. (140 to 176° F.). Good solubility in rubber. No odor in cured rubber. Stable. Non-toxic. Disperses readily. Blooming tendency if used in excess of 1.5% on rubber. Equally as good as Neozone D in antioxidant property and superior to it in providing heat resistance. Excellent resister of flex cracking, slightly better than Akroflex B, but not quite so effective as Akroflex A.
PURPOSE AND FUNCTION. Provides excellent antioxidant properties, heat and flex cracking resistance. Discolors rubber on exposure to light. Has no stiffening effect on rubber.
METHODS OF USE. Add directly to the rubber. Recommend use of 0.75 to 1% on rubber.
VULCANIZATION. No effect on the rate of cure.
PATENTS. U. S. No. 1,781,306.

Albasan

CHEMICAL COMPOSITION. Not disclosed.
SELLER. Naugatuck Chemical.
APPLICATIONS. Chiefly in proofing and air cured goods.
PHYSICAL STATE. Yellow solid with brown surface coating.
PROPERTIES. Sp. gr., 1.172. Melting range, 75 to 100° C. (167 to 212° F.). No odor in cured rubber. Stable. Non-toxic. Disperses readily in rubber.
PURPOSE AND FUNCTION. Confers good aging and heat resistance. Stains cured rubber very slightly. Used in rubber that is to be coated with nitro-cellulose lacquers, etc. Gives dry surface to air cured rubber.
METHODS OF USE. Add directly to rubber.
VULCANIZATION. Acts as activator for thiazoles and aldehyde amines.
PATENTS. Not disclosed.

Antox

CHEMICAL COMPOSITION. A butyraldehyde aniline derivative.
SELLER. E. I. du Pont de Nemours & Co., Inc.
APPLICATIONS. Footwear, dry heat cured products, and heat resisting stocks.
PHYSICAL STATE. Amber colored liquid of medium viscosity.
PROPERTIES. Sp. gr., 1.01. Soluble in rubber. No odor in cured rubber. Stable when stored in closed containers in the absence of air. Non-toxic. Disperses readily. Does not bloom. Has excellent antioxidant and heat resistant properties. Has no effect on flex cracking.
PURPOSE AND FUNCTION. Provides excellent antioxidant and heat resistance. Discolors only moderately when stocks are exposed to sunlight. May be used in light colored products. Prevents "frosting" of acidic accelerators. Has slight softening effect on uncured stock, but does not affect stiffness of cured rubber.
METHODS OF USE. Add directly to rubber. Normal recommendation is 1% on rubber. When using in white stocks, amount should be reduced to 0.5% on rubber.
VULCANIZATION. Accelerates cure of all stocks. Activates such accelerators as Thionex, Acrin, Captax, etc., and lowers critical temperature. In many cases the accelerator content can be reduced 25% when 1% of Antox is used.
PATENTS. U. S. Nos. 1,556,415 and 1,908,093.

A-V-A-R

CHEMICAL COMPOSITION. Not disclosed.
SELLER. Naugatuck Chemical.
APPLICATIONS. For general purpose stocks except those of white or light colors. Tires, inner tubes, molded goods, mechanicals, and insulated wire.
PHYSICAL STATE. Light brown powder.
PROPERTIES. Sp. gr., 1.1326. Melting range, 95 to 105° C. (203 to 221° F.). Very slight odor in cured rubber. Stable Non-toxic. Disperses readily.
PURPOSE AND FUNCTION. Good to inhibit flex cracking. Stains cured rubber brown on exposure to light. Excellent for heat resistance. Exceptionally good in wire insulation and cable jackets.
METHODS OF USE. Add directly to rubber.
VULCANIZATION. No effect on cure.
PATENTS. Not disclosed.

B-L-E

Chemical Composition. Ketone-amine reaction product.
Seller. Naugatuck Chemical.
Applications. Tires, tubes, mechanicals, footwear, soles, cables, and in all stocks where color is not important.
Physical State. Thick brown liquid.
Properties. Sp. gr., 1.087. Soluble in common solvents. Odor aromatic. Stable. Non-toxic. Non-blooming. Disperses readily.
Purpose and Function. Retards deterioration due to heat, oxidation; retards flex cracking. Discolors white and light colored goods.
Methods of Use. Add directly to rubber.
Vulcanization. Very slightly activates thiazoles.
Patents. Not disclosed.

Flectol B

Chemical Composition. Condensation product of acetone and aniline.
Seller. Rubber Service Laboratories Co.
Applications. All classes of rubber goods: tires, inner tubes, belting, hose, heels, soles, footwear, etc.
Physical State. Clear dark brown viscous liquid.
Properties. Sp. gr., 1.04. Flash point, 49° C, (120° F.). Practically insoluble in water; soluble in all proportions in alcohol, gasoline, and benzene. No odor in cured rubber. Stable. Non-toxic. Disperses readily. Non-blooming.
Purpose and Function. Tends to prevent flex cracking. Discolors white stocks less than Flectol A when exposed to sunlight. Estimated to increase flexing life of stocks about 57.5% unaged and about 90% after aging.
Methods of Use. Add directly to rubber.
Vulcanization. No activation on accelerators.
Patents. Not disclosed.

Flectol H

Chemical Composition. Condensation product of acetone and aniline.
Seller. Rubber Service Laboratories Co.
Applications. Satisfactory for footwear either in air or ammonia cures particularly if overlying white stock contains plenty of white pigment.
Physical State. White to a very slight cream color.
Properties. Sp. gr., 1.08. M. p., slightly above 128° C. (248° F.). Odorless in cured rubber. Insoluble in water. Approximately 10% soluble in cold benzene, alcohol, and gasoline. Stable. Non-toxic. Disperses readily. Non-blooming.
Purpose and Function. Tends to prevent flex cracking. Very slightly discolors white stocks. Satisfactory in white stocks in small concentrations. Estimated to increase flexing life of stocks about 57.5% unaged and about 90% after aging.
Methods of Use. Add directly to rubber.
Vulcanization. No effect on accelerators.
Patents. Not disclosed.

Flectol White

Chemical Composition. Not disclosed.
Seller. Rubber Service Laboratories Co.
Applications. White and light colored stocks for druggists' sundries, proofing, hospital sheeting, light colored shoes, latex goods, etc.
Physical State. White powder.
Properties. Sp. gr., 1.25. Flash point, 143° C. (290° F.). M. p. slightly above 145° C. (293° F.). Insoluble in gasoline, nearly so in water and benzene; readily soluble in alcohol. No odor in rubber. Stable. Non-toxic. Non-blooming. Disperses readily.
Purpose and Function. Tends to prevent flex cracking. Does not discolor white or light colored goods. Estimated to increase flexing life of stocks about 57.5% unaged and about 90% after aging.
Methods of Use. Add directly to rubber.
Vulcanization. No effect on accelerators.
Patents. Not disclosed.

M-U-F

Chemical Composition. Not disclosed.
Seller. Naugatuck Chemical.
Applications. In white or light colored molded and air cured goods.
Physical State. Grayish powder.
Properties. Sp. gr., 1.25. Melting range, 166 to 168° C. (331 to 336° F.). No odor in cured rubber. Stable. Non-toxic. Disperses readily. Does not bloom out of either raw or cured rubber when used in amounts not greater than 0.4% on the rubber.
Purpose and Function. Excellent aging. Exposed to direct sunlight causes slight tan discoloration, which can be removed by washing with water. Will not stain fabric. Will produce dry surfaces on freshly cured rubber, normally tacky.
Methods of Use. Add directly to rubber. May be used in ratios as low as 0.25% with appreciable improvement in resistance to oxidation or heat deterioration. One per cent is recommended as normal practice with ratios increased to 2% where extreme protection is desired, but some blooming may be expected when 0.5% or more is used on the rubber.
Vulcanization. Does not require any adjustment of accelerators or plasticizers and has no influence on rate of cure.
Patents. Not disclosed.

Neozone (Standard)

Chemical Composition. Meta-toluylene diamine, 25%; stearic acid, 25%; phenyl-alpha-naphthylamine, 50%.
Seller. E. I. du Pont de Nemours & Co., Inc.
Applications. For compounds in which stiffness is required without excessive loading of reenforcing pigments.
Physical State. Dark gray flakes.
Properties. Sp. gr., 1.16. Good solubility in rubber. No odor in cured rubber. Very stable in storage although it darkens at surface on exposure to light. This does not affect its strength. Toxic. If handled excessively by workmen it may cause dermatitis. Disperses readily. Blooms to surface if used to extent of 3% or more. Good antioxidant, but slightly inferior to Neozones A, C, D, and E by oxygen bomb test. Good preventive of deterioration due to heat, but inferior to Akroflex series in this respect.
Purpose and Function. Discolors light colored rubber. Not recommended for white stocks. Increases elasticity and decreases plasticity of uncured rubber. Very definitely increases stiffness of vulcanized rubber.
Methods of Use. Add directly to rubber. Amount recommended 1% on rubber.
Vulcanization. Accelerates very slightly in compounds containing guanidines, aldehyde amines, and other basic accelerators. Also activates acidic accelerators such as Thionex, Acrin, and mercapto-benzothiazole. Lowers critical temperatures.
Patents. U. S. Nos. 1,761,306 and 1,728,564.

Neozone A

Chemical Composition. Phenyl-alpha-naphthylamine.
Seller. E. I. du Pont de Nemours & Co., Inc.
Applications. For all dark colored goods only for protection against oxidation and flex cracking. Recommended in preference to phenyl-beta-naphthylamine because it is easier to disperse and being more soluble in rubber, is less liable to bloom. Discolors white and light colored stocks.
Physical State. Lemon yellow, crystalline material in small lumps which turn to purple on contact with air and light.
Properties. Sp. gr., 1.17. M. p., 50° C. (122° F.). Very stable in storage. Its strength is not affected by its change of color. Non-toxic. Disperses readily. Does not bloom readily.
Purpose and Function. Gives excellent resistance to oxidation. Fully equal to Neozone D and Akroflex series. Gives fair heat resistance, but is inferior to Neozone (Standard), Neozone C, and the Akroflex series. Gives very good flex cracking resistance, equal to Neozone D, but slightly inferior to the Akroflex series. Softens uncured rubber very slightly, but has no effect on cured rubber.
Methods of Use. Add directly to rubber. It can be used safely up to 5% on the rubber, if desired, without likelihood of blooming. For most purposes 1% on the rubber is sufficient, but 2% for maximum effect.
Vulcanization. Has no effect on rate of cure regardless of accelerator used.
Patents. U. S. No. 1,781,306.

Neozone C

Chemical Composition. Phenyl-alpha-naphthylamine, 92.5%; meta-toluylene-diamine, 7.5%.
Seller. E. I. du Pont de Nemours & Co., Inc.
Applications. For general use in dark colored stocks where increased stiffness without high loading is desired.
Physical State. Grayish-brown lumps.
Properties. Sp. gr., 1.19. M. p., 50° C. (122° F.). Color darkens on exposure to light, but effect on antioxidant properties is negligible. Non-toxic. Does not bloom to surface readily.
Purpose and Function. Excellent antioxidant equal to Neo-

zone A, D, and E. Gives good heat resistance. Flex cracking resistance equal to that of Neozone A, D, and E, but slightly inferior to the Akroflex series. Decreases plasticity and increases elasticity of unvulcanized rubber, but less than Neozone (Standard).

METHODS OF USE. Add directly to the rubber. Recommend 1% on rubber normally and 2% for maximum effect.

VULCANIZATION. Has practically no effect on rate of cure with guanidines, aldehyde amines, or other basic accelerators.

PATENTS. U. S. Nos. 1,781,306 and 1,725,564.

Neozone D

CHEMICAL COMPOSITION. Phenyl-beta-naphthylamine.

SELLER. E. I. du Pont de Nemours & Co., Inc.

APPLICATIONS. A general purpose antioxidant for all dark colored rubber products.

PHYSICAL STATE. Light grayish to faintly pinkish-white finely ground powder.

PROPERTIES. Sp. gr., 1.18. M. p., 105° C. (221° F.). Stability excellent, but should be stored in airtight cans. Non-toxic. Does not bloom in amounts up to 2% on the rubber. Disperses readily.

PURPOSE AND FUNCTION. Excellent preventive of oxidation, equal to other Neozones and the Akroflex series. Gives fair heat resisting properties. A very good preventive of flex cracking, but slightly inferior to the Akroflex series. Discolors rubber on exposure to light.

METHODS OF USE. Add directly to rubber. Normal recommendation 1% on the rubber.

VULCANIZATION. Has negligible effect on cure, regardless of accelerator.

PATENTS. U. S. Nos. 1,781,306 and 1,746,371.

Neozone E

CHEMICAL COMPOSITION. Phenyl-beta-naphthylamine, 75%; meta-toluylene diamine, 25%.

SELLER. E. I. du Pont de Nemours & Co., Inc.

APPLICATIONS. For tire treads and all dark colored products which must withstand abrasion.

PHYSICAL STATE. Very light grayish-tan finely ground powder.

PROPERTIES. Sp. gr., 1.20. M. p., 105° C. (221° F.). Very stable in storage, but should be kept in airtight containers. Non-toxic. Darkens on exposure to light, but its effectiveness is not impaired by this change. Disperses readily.

PURPOSE AND FUNCTION. Excellent preventive of oxidation, equal to Neozone A or D. Excellent preventive of heat deterioration especially for stiff compounds which must not contain high loading. Good flex cracking resistance, but inferior to Akroflex series. Has slight effect on the plasticity of uncured rubber. Stiffens rubber slightly more than Neozone C, but less than Neozone (Standard).

METHODS OF USE. Add directly to rubber. Normal recommendation 1% on the rubber.

VULCANIZATION. Activates acidic accelerators such as Thionex, Acrin, and mercaptobenzothiazole. Has no effect on compounds containing guanidines, aldehyde amines, or other basic accelerators except that it retards slightly the vulcanization of aldehyde amine stocks containing high percentages of zinc oxide.

PATENTS. U. S. Nos. 1,781,306, 1,746,371, 1,725,564, 1,875,903.

Parazone

CHEMICAL COMPOSITION. A substituted hydroxy benzine.

SELLER. E. I. du Pont de Nemours & Co., Inc.

APPLICATIONS. For use in pure white stocks to be exposed to strong sunlight.

PHYSICAL STATE. A white finely ground powder.

PROPERTIES. Sp. gr., 1.20. M. p., 159° C. (318.2° F.). Very stable in storage if kept in airtight containers. Non-toxic. Does not stain or discolor rubber either before or after exposure to sunlight. Disperses readily. Blooms to surface to some extent, but this is not apparent in white stocks.

PURPOSE AND FUNCTION. Strictly non-discoloring antioxidant. Has fair quality as preventive of oxidation; much weaker than Neozone D. Antioxidant properties much more effective at normal than at elevated temperatures. Of no value as a heat or flex cracking preventive. Has no effect on stiffness of rubber before or after cure.

METHODS OF USE. Add directly to the rubber. Normal recommendation 1 to 2% on the rubber.

VULCANIZATION. Effect on rate of cure negligible.

PATENTS. U. S. No. 1,850,749.

Permalux

CHEMICAL COMPOSITION. D.O.T.G. salt of dicatechol borate.

SELLER. E. I. du Pont de Nemours & Co., Inc.

APPLICATIONS. For light colored or white stocks cured in press or steam. Effective in uncured stocks. Not effective in dry heat cures.

PHYSICAL STATE. A grayish-white powder which darkens on standing.

PROPERTIES. Sp. gr., 1.14. M. p., 165° C. (329° F.). Stability good; should be stored in airtight containers. Non-toxic. Non-blooming in recommended amounts. Discolors white stocks only slightly on exposure to sunlight.

PURPOSE AND FUNCTION. Has no effect on plasticity or stiffness of cured and uncured rubber. Does not provide heat resistance or flex cracking properties. Unsuitable for use in latex as it discolors badly in alkaline solutions.

METHODS OF USE. Add directly to the rubber. Normal recommendation 1 to 2% on the rubber.

VULCANIZATION. Activates Thionex, Acrin, Captax, and other acidic accelerators. Does not affect the rate of cure of guanidines or D.O.T.G.-Thionex combinations. Has only slight activating effect on Thionex-Barak combinations.

PATENTS. U. S. Nos. 1,902,005 and 1,975,890.

Solux

CHEMICAL COMPOSITION. Para-hydroxy-phenyl-morpholine.

SELLER. E. I. du Pont de Nemours & Co., Inc.

APPLICATIONS. For use in all light colored or white stocks. One of the most economical antioxidants available.

PHYSICAL STATE. A light cream colored powder.

PROPERTIES. Sp. gr., 1.28. M. p., 168° C. (334.4° F.). Stability excellent, but should be stored in airtight containers. Non-toxic. Disperses readily. Solux stocks discolor very slightly on exposure to sunlight. Tends to bloom to surface when in excess of 0.25% on the rubber.

PURPOSE AND FUNCTION. Very effective antioxidant comparing favorably with Neozone D. Very definitely superior to Permalux. Provides fair amount of heat resistance to rubber. Gives excellent resisting to flex cracking and is the only non-discoloring antioxidant having this property. Has no effect on plasticity of uncured rubber or on stiffness of vulcanized rubber.

METHODS OF USE. Add directly to the rubber. In recommended amounts is nearly as effective as 0.75% of Neozone D. Normal recommendations as follows: for heat cured products use only 0.25% on the rubber; in sulphur chloride cures, 0.125% on the rubber is sufficient.

VULCANIZATION. No effect on rate of cure, regardless of accelerator used.

PATENTS. U. S. No. 1,899,058.

Stabilite

CHEMICAL COMPOSITION. Diphenyl-ethylene diamine.

SELLER. The C. P. Hall Co.

APPLICATIONS. General purpose antioxidant for tire stocks.

PHYSICAL STATE. Cream colored powder.

PROPERTIES. Sp. gr., 1.15. M. p., 55 to 65° C. (131 to 169° F.). Soluble in benzol, acetone, etc. Stable. Non-toxic. Disperses readily.

PURPOSE AND FUNCTION. Retards sun checking and flex cracking. Plasticizes rubber during mixing. Stains only slightly.

METHODS OF USE. Add directly to rubber and mix as usual.

VULCANIZATION. Not disclosed.

PATENTS. Not disclosed.

Stabilite-Alba

CHEMICAL COMPOSITION. Diortho-tolyl-ethylene-diamine.

SELLER. The C. P. Hall Co.

APPLICATIONS. Antioxidant for white and light colored stocks.

PHYSICAL STATE. Light purplish-brown coarse powder.

PROPERTIES. Sp. gr., 1.12. Soluble in benzole, acetone, etc. Stable. Non-toxic. Disperses readily.

PURPOSE AND FUNCTION. Antioxidant with minimum staining qualities. Aids dispersion and retards sun checking.

METHODS OF USE. Add directly to rubber and mix as usual.

VULCANIZATION. Not disclosed.

PATENTS. Not disclosed.

V-G-B

CHEMICAL COMPOSITION. Acetaldehyde-aniline-hydrochloride reaction product.

SELLER. Naugatuck Chemical.

APPLICATIONS. Mechanicals, rubber rolls, specialties, and no-mark soles.

PHYSICAL STATE. Brown resin.

PROPERTIES. Sp. gr., 1.152. Melting range, 60 to 80° C. (140 to 176° F.). No odor in cured rubber. Stable. Non-toxic. Non-blooming in amounts ordinarily used. Dispersion best by master batching—rubber 50—V-G-B 50.

PURPOSE AND FUNCTION. Excellent aging. Brown discoloration of stocks deepening on sunlight exposure. Stiffening effect on uncured rubber.

METHODS OF USE. Add in master-batch form.

VULCANIZATION. No appreciable effect on cure.

PATENTS. Not disclosed.

THE principal functions of a tire on an automotive vehicle are: (a) to carry the weight of the vehicle, to cushion it over road irregularities, and to eliminate noise; (b) to provide sufficient traction for accelerating, driving, and braking; and (c) to provide adequate steering control at high speeds.

Adequate steering control, taken for granted in the early days of automobiles, becomes highly important as driving speeds increase. The property of tires whereby steering is accomplished is called cornering power. This power is practically negligible in hard wheels, but is possessed by pneumatic tires due to the extended area of road contact.

Cornering thrust is developed when the plane of the rotating tire makes an angle with its path of travel. The thrust is proportional to this angle up to the point where slippage begins. When a tire is cambered, the cornering force is increased or diminished depending on whether the tire leans "into" or "away from" the curve.

Increase of inflation pressure or of rim width increases the cornering power. Certain structural features of the tire itself affect its cornering effectiveness. However, any change, whether internal or external, which improves cornering power, makes the cushioning ability of the tire worse.

Tread wear continues to be the most important aspect of tire performance. Of the 1934 cars, with various types of springing and of load distribution, some cause much faster tread wear than others. There is also a tendency, as compared with previous years, for rate of wear of front tires to approach that of rears.

Properties of Tires

Affecting Riding, Steering, and Handling[1]

R. D. Evans[2]

FUNDAMENTALLY, driving an automobile consists in maintaining appropriate control over a somewhat complex and ever-changing system of forces. In the last analysis these forces all center or focus at the areas of contact between tires and road. These areas are the very front-line trenches in the furious battle between space and time. It is therefore appropriate, now and then, as driving conditions change, as speeds increase, and as automotive design develops and evolves into new fields and forms, to take stock of the situation; to discover whether the means and mechanism of control of this complexity of forces is keeping suitable pace with the magnitude and relationships of the forces themselves; and to enlighten ourselves, possibly, as to the ways and means for promoting still greater safety and enhanced comfort in our automotive transportation.

Since the tires are so intimately involved in the control of these forces, there is a responsibility on us to determine in comprehensive detail just how the several properties of the tires are related to the problem. It is a purpose of this paper to report some of the recent progress along this line.

The Functions of a Tire

Suppose the question were asked: "What, after all, are the basic reasons for using pneumatic tires on modern automotive vehicles?"

We would immediately answer: "To provide cushioning on jolty roads and to eliminate noise." Then, after further thought, we probably would add: "To provide a large amount of friction between vehicle and road so that rapid acceleration and deceleration are possible without skidding."

Perhaps most of us would stop there. But a more searching analysis would show that the tire has at least one more vital function.

For let us imagine that, through some magic, all our roads should suddenly become perfectly smooth, like plate glass, so that the cushioning ability of the tires would no longer interest us. And further, that all mankind were to lose the sense of hearing so that noise, even of hard wheels rattling on hard roads, would no longer be comprehended. Finally, assume the existence of some material, rigid, like metal, but having as high a coefficient of friction on our magically smooth roads as does rubber on concrete. Let this material be used for the rims or treads of wheels, so that we could forget about tread wear and punctures and blowouts and other such evils. Would we not then have perfectly satisfactory rolling equipment? My answer is that we would still have vital need of the pneumatic tire, in order to have adequate directive control of the car. There is no imaginable alternative. Hard wheels would be satisfactory on a wagon pulled by a tongue or on one guided by flanges. But when the steering is done from within the car itself, only at very low speeds would the hard-rimmed wheel give adequate steering control.

Directive control, then, survives as the one function which can be provided, in adequate amount at present-day speeds, only by the pneumatic tire. The data and discussion presented later in this paper will make clear why this is so. This property of the pneumatic tire has very appropriately been named *cornering power,* and it is probably the most important contribution of the tire maker to the "roadability" of the modern motor vehicle.

[1] Presented at the annual meeting of the Society of Automotive Engineers, Detroit, Jan. 16, 1935. Reprinted from *S.A.E. Journal,* Feb., 1935, pp. 41-49.

[2] The Goodyear Tire & Rubber Co., Akron, O.

However since our roads are not yet glass-smooth and since our ears are still sensitive to the roar of hard wheels rolling on hard surfaces, our interest in cushioning is not likely to abate. These two properties, then—cornering and cushioning—are submitted as the two indispensable characteristics of a tire.

Cornering or Cushioning

The sentence just preceding says "cornering and cushioning;" but, when we actually get to working with tires, we find that it is a case of "cornering versus cushioning." Modern tires, of course, possess a certain amount of both these qualifications, but we all know the ever-increasing cry of "more, more." There are various ways in which cushioning can be improved, but each and every one of them makes the cornering worse. In illustration, consider the effect of pressure. We all know that a reduction of pressure improves the cushioning action of the tires. However their cornering power is correspondingly reduced so that a pressure is soon reached at which the steering and the handling of the car become unsatisfactory.

It is always one of the major problems of the tire engineer to discover in what way more cushioning may be "bought" with the least expenditure of cornering "coin." Obviously, good cushioning demands flexibility in the tire structure; otherwise it cannot conform to the road irregularities. But cornering demands a sort of rigidity or stability in the same structure. These demands are quite analogous to those on an automobile spring, which must be flexible in an up-and-down direction, but as rigid as possible in the lateral direction. The tire designer is therefore confronted with the task of building both rigidity and flexibility into the same structure, as much of each as possible, and then still more. Quite an order!

THE "TIRE TRIPOD"—CORNERING, CUSHIONING, AND DURABILITY. Underlying these considerations of cornering and cushioning, and obviously of the highest importance to the tire designer, is the ever-present problem of durability. Durability may refer to tread wear, or to carcass deterioration, or to bead disintegration, or to other "diseases," depending on the conditions of service. And just as cornering and cushioning call for contradictory qualities, so are both of them always at odds with considerations of durability. These three factors may be called the tripod of tire performance; any attempt to improve one of them is apt to be at the expense of one or both of the others and to disturb the level of satisfactory operation. Much of tire engineering resolves itself into a three-way compromise within the limits of this "tripod."

Force Analysis

Let us return now to a more specific consideration of the forces which act between tire and road. We may well begin this analysis by looking at this complex of forces in the manner of the mathematician; that is, by resolving it into certain logical components. Having done this, as simply and painlessly as possible, we shall probably emerge with:

(1) The force between tire and road perpendicular to the area of contact. This force is, of course, the weight of the car, with fluctuations and perturbations thereof caused by road irregularities and the centrifugal effect on curves. This force will hereafter be referred to as the vertical force or as the radial load on the tire.

(2) The force in the plane of the contact area and parallel to the direction of travel. This is, of course, the tractive force involved in accelerating, maintaining speed, or decelerating, and it also includes the rolling resistance of the tire. It will be referred to in this paper as the tractive force or as the rolling resistance, as occasion requires.

(3) The force in the plane of the contact area, but directed, at each instant, at right angles to the path of travel of the tire and vehicle. We may speak of this as the lateral force, or the cornering force, or as the side load on the tire.

It is obvious that forces (2) and (3) depend ultimately on the existence of friction between tire and road, and therefore can possess magnitude only when force (1) exists. In passing, it is of interest to note that, historically, the automotive world has concerned itself with these three groups of forces in this same order.

First, in the very early days of automotive design, when power plants were small, speeds low, and roads rough, the demand was primarily for a structure which would not collapse under its own weight or break up under road jolts. Similarly for the tire; it was asked merely to carry its load for a few hundred miles before it, too, cracked up. Who in those days worried about tire noise, or ability to handle tractive effort, or sidesway, or squeal? Who noticed whether the tire gave too much of a grunt as it rolled over an expansion joint?

Second, in what we may call the middle ages of automotive history, power plants were pepped up and quieted down; brakes were improved to handle the increased speed; and smooth hard roads became less of a curiosity. So with the tires; not only were they called upon to stand up structurally, but also to handle the increased tractive duty of faster starting and stopping on smooth roads.

In the third and present epoch, we find ourselves increasingly concerned with the group of lateral forces. Largely because of higher speeds and of the urge to take the curves as fast as the straight stretches, these lateral forces, which maintain the car in a smooth true path, or perturb its motion with respect to such an ideal path, must be analyzed more searchingly than ever before.

Special Testing Equipment

In the tire testing laboratory of the Goodyear Tire & Rubber Co. a special machine has been installed whereby these several forces may be measured accurately under any desired operating conditions of speed, camber, and orientation. Numerous sizes and types of tires have been investigated under various conditions of load, inflation, and rim mountings. The experimental data now to be presented were obtained with this equipment.

Definition of Cornering Power

Cornering power may be generally defined as the ability of a tire to develop side load or lateral thrust. It is the property of the tire which permits steering around a curved path at speed, and, conversely, it is that property which holds the car in a substantially straight path when acted on by incidental lateral forces such as wind.

Cornering force or thrust appears when the tire is caused to roll in such a manner that its plane of rotation makes an angle with the path of advance. This angle, sometimes spoken of as toe-in, is more appropriately called *slip angle*. The manner in which cornering force depends on slip angle is shown in Figure 1. These values of Figure 1 apply to a particular size and type of tire under the conditions indicated. The *slope* of the straight part of this line, that is, the cornering force per degree of slip angle, may be called the cornering power of this particular tire. The value of cornering power illustrated in Figure 1 is 126 pounds per degree. This curve illustrates the typical relationship of cornering force and slip angle. The cornering force is substantially proportional to the slip angle until the latter becomes 4 or 5°, then

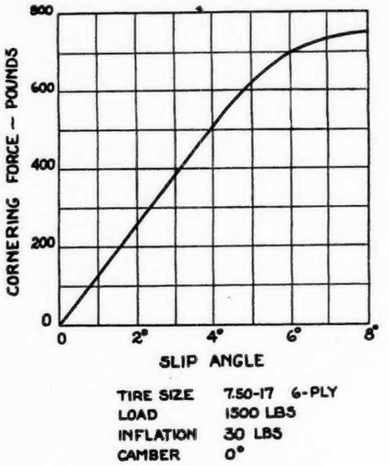

Fig. 1. Illustration of the Manner in Which Cornering Force Depends on Slip Angle

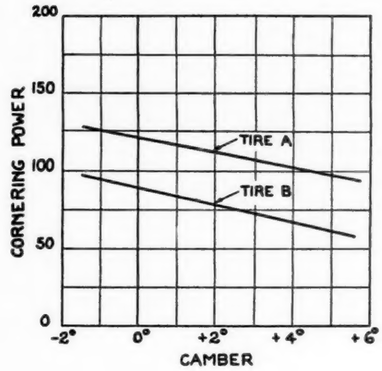

Fig. 2. Showing How Camber Affects Cornering Power

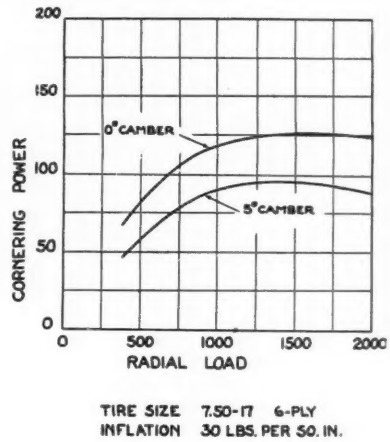

Fig. 3. Curves Showing How the Cornering Power Varies with the Radial Load on the Tire

"tapers off."

The initial slope of the curve is practically independent of the texture of the road surface if it is hard and dry and reasonably smooth. The value of slip angle at which "tapering off" begins does depend to some extent on the road texture; for, as has been pointed out earlier, this lateral force must depend ultimately on the basic coefficient of friction between tire tread and road. In any case the cornering force appears to have reached its maximum for a slip angle of 9 or 10°.

Factors Which Affect Cornering Power

(1) Camber. When a car travels around a curved path, more or less camber of the several wheels is introduced. It is therefore of primary importance to see how camber affects cornering power. Figure 2 illustrates this effect. Camber is called positive when, in taking a curve, the top of the tire leans away from the center of the curved path. The camber effect may be thought of as a sort of push of the "foot" of the tire sidewise against the roadway when the tire leans over. This push is added to or subtracted from the thrust due to slip angle, depending on whether the tire leans "into the curve," as in a bicycle, or outward with respect to the curve, as in most of the 1934 cars with independent front springing.

This camber "push" depends not only on the angle of camber, but also to some extent on the tire construction. Tire *B* illustrates this point. It is the same sized tire as *A*, and its cornering thrust was measured under the same conditions of load, speed, inflation, and the like. Not only does it have less cornering power than *A* at 0° camber—approximately 72% as much—but the change due to camber is greater. Thus for each degree of positive camber *B* loses 5.6% of its cornering power; whereas *A* loses only 4.2%. We have not been able to discover any type of tire construction which will eliminate this camber effect or reduce it appreciably below the value of tire *A*.

(2) Radial Load. Figure 3 shows how the cornering power varies with the radial load on the tire. For ranges of load between 50 and 150% of the normal rating of the tire, the cornering power does not change greatly although there is usually a point of maximum power in the general region of the rated load. This maximum is more sharply indicated when the tire is positively cambered, as is also shown in Figure 3. However any benefit implied in this maximum is illusory. For consider that the usefulness of cornering power is that it provides a lateral thrust which keeps pushing the car around the curve, opposing or balancing the centrifugal effect. The centrifugal effect is, of course, proportional to the axle load. Hence we

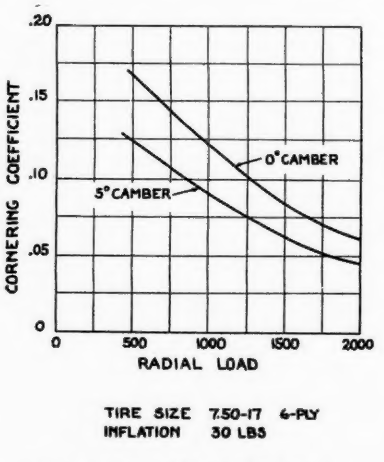

Fig. 4. Data of Fig. 3 Replotted

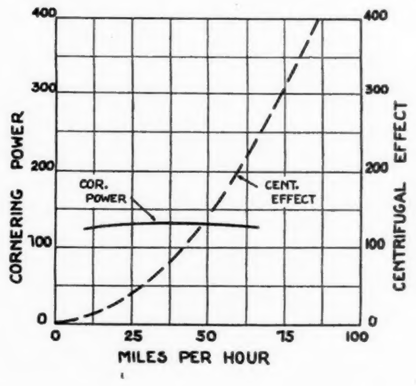

Fig. 5. Showing That Cornering Power Changes only Slightly with Speed

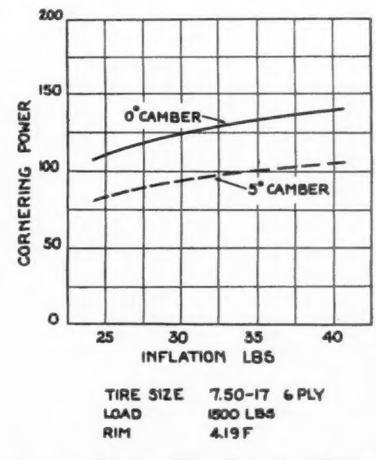

Fig. 6. Showing How Cornering Power Depends on Inflation Pressure

should really consider the magnitude of the cornering force in relation to the radial load on the tire; this idea leads at once to the conception of a "cornering coefficient," which may be defined as the cornering power per unit of radial load. The data of Figure 3 are replotted on this basis in Figure 4. There is now no maximum point. The principal lesson to learn here is that the more load a tire carries the less effective it is as a mechanism for pushing that load around a curved path.

(3) SPEED. Cornering power changes only slightly with speed, as shown in Figure 5. This fact has a very important implication. The centrifugal effect on curves increases as the square of the speed; whereas the cornering power, wherewith we oppose or balance the centrifugal effect, does not increase appreciably with the speed. This is the reason why cornering problems are much more difficult of solution when the speed is high. Thus a cornering coefficient which is entirely satisfactory at 25 m.p.h. may be inadequate at 50 m.p.h. and intolerably "tricky" at 75 m.p.h. An attempt to illustrate this comparison also appears in Figure 5, in which an arbitrary "centrifugal effect" is plotted against speed in the dotted line.

(4) INFLATION. Figure 6 shows how cornering power depends on inflation pressure. The data apply to a 7.50-17 heavy-duty tire. However for a wide variety of sizes and types of tire the increase of cornering power is between 2.0 and 2.5 pounds for each pound increase of inflation, in the pressure range between 25 and 35 pounds per square inch. At higher pressures, however, the effect tapers off, as Figure 6 indicates. Increase of inflation pressure is, of course, the standard way of getting better cornering action, also a harder and joltier ride!

(5) RIM WIDTH. The flange-to-flange width of the rim on which a tire is mounted likewise has an important bearing on cornering power. In Figure 7 this effect is shown for the tire of Figure 6. Here, again, cornering power improves as the rim width increases, but the improvement "tapers off" as the rim approaches the width of the tire itself.

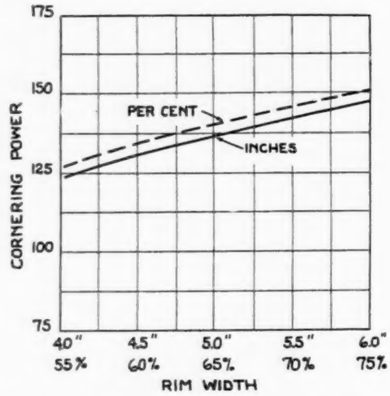

Fig. 7. Showing, for the Tire of Fig. 6, That the Flange-to-Flange Width of the Rim Has an Important Bearing on Cornering Power

Of course, when the same tire is mounted on rims of different widths, its own width is changed. The wider the rim the wider the tire. If we express the rim width, not in inches, but as a percentage of the actual side-wall diameter of the tire mounted thereon, we get the dotted line of Figure 7.

The question immediately presents itself: Is not increasing the rim width a good way to get more cornering power, and what are the limitations and restrictions involved? For one thing, increase of rim width diminishes the cushioning ability of the tire, just as does an increase of inflation. This will be shown more fully in a later paragraph. Hence the compromise point may well be governed by considerations of tire durability.

The scope of this paper will not permit a complete discussion of the many pros and cons of rim width. Present practice with modern low-pressure tires offers rim widths from 62 to 72%. Too narrow a rim causes more rapid tread wear; one too wide may lead to carcass and bead troubles. There is an optimum point here which is none too well defined because it depends on the type and proportions of the tire, the operating pressure, and very greatly on the conditions of service.

(6) TIRE SIZE. In addition to the preceding factors, all of which are external to the tire structure itself, several structural features themselves affect this important property. For instance, what about the size of the tire; does a large tire have as much cornering power in proportion as a small one? Consider a 5.25-17 4-ply and a 7.50-17 6-ply heavy-duty tire, both of standard construction and design. These two tires have Tire and Rim Association load ratings of 885 pounds at 32 pounds per square inch inflation pressure, and 1,645 pounds at 36 pounds per square inch inflation pressure, respectively. At these loads and inflation pressures, and on their respective recommended rims, the cornering powers of these two tires are 102 and 138, respectively. The cornering coefficients, as previously defined, are therefore 0.115 for the smaller tire and 0.085 for the larger. Obviously the smaller tire is far more adequate for the cornering work it has to do. Here is one very important reason why steering and handling large cars at high speed is more of a problem than for small cars.

Also for large, high-speed cars, particularly if one axle load is 20 to 30% greater than the other, the advantage of dual-tire equipment on the heavy end is inescapably obvious. While there are many pros and cons with respect to this proposition for passenger cars, there is no question that large single tires on the lighter end and smaller dual tires on the heavier end constitute the optimum arrangement for steering and maneuvering a heavy car at high speed.

In this connection it is well to remember that a large tire is not merely a magnification of a small one. In the comparison above even the most elementary attempt to "similarize" the two sizes would indicate a 23-inch instead of a 17-inch rim diameter for the 7.50 tire. Such an increase of rim diameter would give a somewhat higher cornering coefficient. But in these days, when we go that high into the air for our transportation, we simply take an airplane!

(7) CORD ANGLE. One of the more important and versatile structural features of a tire is the cord angle. A moderate change in cord angle can profoundly affect many of the performance characteristics of the tire. This is strikingly true of cushioning and cornering. Thus, we find that a 10° increase in cord angle—that is, laying the cord more nearly cross-wise of the tire—gives a very intriguing improvement in cushioning. But, unfortunately, the price which has to be paid in cornering and in durability is impossibly high. An excellent illustration of the "tire tripod!"

(To be continued)

Footwear Imports

United States imports of rubber soled canvas shoes for November, 1934, totaled 55,430 pairs, value $13,212. From Czechoslovakia came 9,440 pairs of tennis shoes, value $4,395. The total November, 1934, imports of boots and shoes were 4,663 pairs, value $1,714. Czechoslovakia sent 3,550 pairs, value $1,359.

The Foreman's Job

Analysis of Foremanship Responsibilities

G. F. Buxton

IT IS gratifying to realize that business will go on regardless of economic and political eventualities—so also economic and political eventualities will progress. It is not only logical, but also reassuring to realize that business will proceed faster and better in proportion to the extent that men in all positions will again concentrate full attention on their jobs.

Foremen particularly have been harried the past few years with the distracting influences of the depression and the necessity of NRA adjustments. The time is at hand for their minds to be refocused on the job of departmental management. A thoroughly workable comprehension of the complex responsibilities of a foreman's job can be gained and retained only by a periodic analysis of that job and a study of each component responsibility.

"Analysis of Foremanship Responsibilities" is the introductory installment of a series of articles on "The Foreman's Job" that performs just this mission. Succeeding issues will continue with such important aspects of the foreman's responsibilities as: "Control of Costs and Quality of the Product;" "Cooperation Important in Foremanship;" "The Foreman as a Shop Teacher;" "Getting and Holding the Worker's Interest;" and "Evaluating Foremanship Responsibilities."

Professor G. F. Buxton, Purdue University, Lafayette, Ind., the author of this series, has devoted many years to industrial and foremanship training in most plants of the various Indiana industries. His work in the various rubber plants of that state has been conspicuously successful. His discussions will be interesting, instructive, valuable, and will help at this time to direct the trend of thought into proper and effective channels.

A FACTORY foreman is directly charged with the job of getting out production. He must get it out on time and up to the established standard of quality, but he has also many important related responsibilities. He must keep his departmental costs inside of the budget allowed him, or within a reasonable amount. He must keep his workers satisfied and efficient at all times. He must keep such records as are required by the management. He must keep his shop in order and the machines and other equipment in proper repair. All of these things and many others must be attended to in order to do his part in helping the business to produce a justifiable return.

A Delegated Responsibility

A foreman has a delegated responsibility. Part of his work is assigned to him by a higher executive. He shares the work which the executive cannot do alone because an executive cannot be in many places at one time. So the foreman represents the management in the affairs of his department. His part in the factory's program of production is to act as a minor executive. His job is to manage that fraction of the total factory operations which it is possible for one man to observe and direct. He makes an effort to see that the plant manager's ideas and orders are understood and carried out, and he usually has the authority to see that this is done. He gives orders and instructions to workers and he watches them in the performance of their work. He sees that conditions are suitable for correct, on-time, safe, and economical production. He assumes his share of responsibility for the control of many items which affect such production. He must do his part toward the control of mistakes which may result in increased cost, lowered quality, or slower production.

Foremen Are Supervisors

Frequently those in charge of production departments are called supervisors. One important thought in supervision is that of exercising superior vision or expert observation over the activities of the department. Supervision is "superior vision." Foremen recognize that this need of constantly watching all that is going on is at the heart of their job. They are always inspecting the product, checking quantities, examining machines and machine set-ups, seeing that employes are following standard practice, and watching costs. As a supervisor, a foreman is continually observing those things which are his to control. To control is first to know. He must know at all times what is going on under his direction. Ability to observe expertly is a vital part of good foremanship.

Foremen Are Instructors

Foremen have many occasions for training workers. They break in new employes and they improve older workers. They explain new set-ups and new operations. They criticize bad shop practice and try to bring it up to standard. They discover misunderstandings which must be cleared up. They notice wrong attitudes which must be changed. The need of acting in the capacity of a teacher is nearly always present. A foreman may profitably take time to think over some of the elements of a shop teacher's job. He may note how a teacher analyzes instruction needs, how he plans what to teach at any given time, how he gets the instruction over to the worker, and how he checks the effectiveness of such instruction.

Leadership

Leadership is an important aspect of foremanship. In directing a group of workers a foreman may be a leader or a driver. Better success usually comes with leadership. A foreman gets to understand his men and deals with them in a way to get their wholehearted effort. He works with men in a spirit of cooperation rather than by using the attitude of a military officer in commanding a military unit. He realizes that he must get the man's interest and that the man must be fully sold to his job. As far as possible, he says: "Let's do it," instead of

"You do it." He shows a willingness to do his own part in an undertaking. A leader is a hard worker himself. He keeps himself in good health and physically active. He likes his work and develops enthusiasm among his associates. He knows where he is going and develops confidence on the part of his men that they are doing something worth while. A leader has an assurance about himself and his work, but is not overbearing and does not discourage or dishearten those who are under his authority. His influence over others is positive and constructive. While the driving of men may have its place at times, the foreman should aim to be a leader.

Trouble Shooters

A foreman is forever finding something going wrong. It is his duty to discover production mistakes, to know how to correct them, and to take the necessary steps for their correction. He may find it desirable to know in advance the kinds of troubles that are liable to happen and to be ready to do what should be done to get out of such troubles. He must recognize also that it is even more important to prevent things from going wrong. If he fails to do this, it is of next importance to detect the trouble at its early stages and get it fixed before serious damage has been done. But, early or late, he must see that troubles are either avoided or corrected. The foreman must always be a trouble shooter.

Varied Duties

Foremen are maintenance men to some extent. They assume a part of the responsibility for the care of the tools of the shop and for the shop itself, although a special department may make all major repairs. Foremen are custodians, more or less, for cleanliness and orderliness. They are inspectors of their products, regardless of later inspections made by an inspection department. They are safety men, sharing with a safety department the necessary attention to dangerous machines and dangerous operations. They also share some of the work done by watchmen, detectives, or policemen, in locating and attending to cases of dishonesty. They become inventors occasionally, devising new ways of doing things, supplementing the work of the engineering or tool-designing department. Foremen have a few main responsibilities and a large number of incidental opportunities.

Let us look now at the foreman's job as a whole. What is his usual routine? What responsibilities, as noted above, does he have? What troubles does he meet? What must he know about his job? What must he be able to do? What interests does he have? What may he profitably study? We may briefly name some of these features of the foreman's job.

Daily Routine

What does the foreman usually do? The following items are representative of the usual routine followed by many plant foremen to maintain steady production. Most of the time of the average foreman is spent on such routine. He takes steps to keep things running according to schedule.

1. He gets ready for the day's work: examining the production schedule, noting that orders are correct and that suitable stock is available; making sure that he has the right working force on hand; seeing that machines are in condition for the day's work; noting that yesterday's quota of work has been met; making plans for the day's supervision.

2. He observes all that goes on in his department: the quality of products as they are being made; the standard speed being followed; the amount of scrap that is appearing; the attitude and efficiency of all employes; the control of whatever makes for the health and safety of employes.

3. He keeps things running smoothly: after observing mistakes in production, he takes immediate measures to correct them. After observing a lack of interest, he finds the cause and tries to rebuild an interest. After observing inefficient operators, he sees that they get proper instruction.

Continuous Duties

What responsibilities does a foreman have? Briefly stated, we may recognize the following five items as covering the ordinary responsibilities which every foreman assumes. In any individual plant he may be assigned to such duties as the chief executive wishes to delegate to him.

1. He follows production orders through the department. He sees that the expected quota of satisfactory work is produced.

2. He sees that the personnel of his department is qualified for the work being done. He trains them, criticizes them, improves them, and keeps a check upon their efficiency and their interest in their work.

3. He keeps the shop in proper condition for its work. He sees that equipment is properly maintained, cleaned, adjusted, repaired, and kept where it belongs.

4. He controls all materials and work in process. He sees that they are in order, properly protected, accounted for, and moved with dispatch when wanted.

5. He watches production costs in his department. He learns what kinds of costs are a part of his responsibility and plans continually to keep such costs under control.

Adjusting Troubles

What troubles does a foreman meet? In addition to the usual routine of a foreman's job, perhaps as a part of it, we must recognize that a foreman is a trouble shooter. Things go wrong, and, as was previously stated, the foreman is there to get them fixed. Some of the types of troubles and corrections he faces are listed below:

1. Correcting mistakes in shop orders or in materials for shop orders. Taking the necessary steps in time so as to make promised deliveries on time.

2. Taking charge of a situation when there is power trouble. Providing for the best use of shut-down time. Getting power trouble corrected and production resumed.

3. Caring for accidents to members of the department. Giving personal care or making sure that proper care is being given. Taking steps to prevent the same kind of accident occurring again.

4. Settling grouches and misunderstandings. Using tact and clear thinking and self-control. Finding the cause of the bad feeling and getting rid of the cause if possible.

5. Shooting trouble in a machine breakdown. Getting a temporary repair if speed is urgent. Seeing that a permanent repair or an entire rebuilding is undertaken if the job warrants it.

6. Discovering a sudden increase in scrap percentage. Locating the real difficulty, getting it fixed, and checking the results under the new conditions.

Knowledge Requirements

What must a foreman know about his job? The foreman must know first those aspects of his job which enable him to attend to the daily routine of work. Then he may feel enough interest to learn more fully regard-

ing other matters related to and affecting his work to some extent. Some of the things he should know are:

1. Production standards of quality and speed and cost. The established or reasonable limits and, perhaps, how they have been determined, what they mean, and their importance to the company and its customers.

2. Company traditions and practices and points of view. Developing a spirit of loyalty to the company. Taking a vital interest in the company's success.

3. Human nature and how to get the best efforts from workers. Realizing that everything depends upon having a crew of capable, interested employes. Understanding people and knowing the ways of getting their best response.

4. The capacity, varied uses, and danger limits of machines in the department. Becoming thoroughly acquainted with all pieces of equipment. Knowing how to get the best service out of each.

5. Any unsatisfactory features of the department. Without becoming a knocker, being aware of the weak spots in the shop. Attempting to find ways of making improvements.

Ability Requirements

What must a foreman be able to do? In order to direct properly the work of the department a foreman should be able to organize work for others to do and to supervise them in doing it. Some of the special abilities needed are:

1. Ability to analyze a situation, to see the important elements of production in their right relation.

2. Ability to plan for a day's work as well as for longer periods, to get the necessary things done.

3. Ability to assign jobs, to instruct workers, to supervise them while at work, and to maintain their interest and effort.

4. Ability to do reasonably good work with each of the standard tools in the shop for all typical shop operations.

5. Ability to keep the necessary production records accurately and up to date. To know the meaning of these records.

Personal Interests

What interests does a foreman have? Foremen vary in their interests, but they should find much to like about their work. Different things appeal to different foremen. In order to keep an active and effective attention to the daily routine of production, one or more of the following interests may become the dominant pull that keeps him profitably busy at his job:

1. The regular daily activities of supervising production. The job itself. The every day routine. The habit of doing standard work.

2. The mechanical interests concerned with production. The liking for machines. The pride in smooth running machinery.

3. The satisfactions in getting men to do their best. A strong human interest in seeing people develop into better workers.

4. The "spirit of the game" of production. An interest in maintaining yesterday's record or in bettering it.

5. The desire to improve some part of the job. The inventive attitude, looking to the possibility of improving the tooling scheme.

6. The larger understanding of manufacturing problems. An interest in some of the fundamentals of business, of factory management, of engineering, or of sales, as they affect what a foreman does.

7. The possibility of advancing some day. Working hard today so as to be ready for a larger job tomorrow if an opening appears.

Mental Improvement

What may a foreman study with profit? Some foremen find time to acquaint themselves with phases of industrial management during their spare time. They read books and trade magazines, business reports, and other literature giving them a better outlook over related fields of thought. The field of such reading is very broad, but we may name a few of the lines of thought sometimes undertaken:

1. Modern manufacturing methods. Specialized tooling, quantity production, control systems, gages and inspection, conveying systems.

2. New production materials and processes, and new products resulting from them. Keeping in touch with changes taking place following new discoveries and inventions.

3. Economics of production and distribution. Financial problems at the present time. The pay for labor, for management, and for the investor.

4. The government and the manufacturer. Some of the difficulties due to the depression. The government's activity in the control of production and distribution today.

5. Labor problems in industrial management. Determining the value of labor's efforts. Unemployment problems. Labor representation problems. Providing desirable working conditions.

In this attempt to look at the foreman's job as a whole, a seven-fold analysis has been proposed.

1. What is your usual routine?
2. What responsibilities do you have?
3. What troubles do you meet?
4. What must you know about your job?
5. What must you be able to do?
6. What interests do you have?
7. What do you study?

What will a listing of your answers to the seven questions reveal to you concerning your job and your department?

Para-Graphs

ANTI-SLIP RUG LINING. The preparation of an anti-slip lining for rugs is accomplished by impregnating and coating a woven burlap fabric with natural rubber latex to which may have been added small amounts of ammonia and protective colloids to keep the product alkaline and prevent coagulation. Other ingredients including dyes and sizing may also be added. The burlap fabric is impregnated by being drawn through a tank of the latex mixture. Afterward the contained moisture is removed by passing the fabric over currents of warm air through a drying chamber. It is then rolled with a non-sticking paper liner ready for cutting up in sizes for use as non-slipping rug liners.

PERFORATED RUBBERIZED CORSET FABRIC. A lightweight pink stockinette fabric, napped one side, is calender coated on its unnapped side with a suitable compound. A piece of pink knitted silk is coated in a similar manner, and both fabrics are then run through squeeze rolls with the rubber faces together, thus producing a layer of rubber between the two fabrics; the total thickness of which is about 0.040-inch. The combined fabric is next perforated by punching holes $^1/_{32}$-inch, spaced

(*Continued on page* 44)

Softened Rubber

P. E. Cholet

THE long-felt need of a rubber soft enough so that fillers and other compounding ingredients can be mixed into it rapidly and easily is now filled and considerable interest has been aroused by its recent introduction under the name of ESSAR (softened rubber).

The method of Schidrowitz and Ungar[1] used to produce this softened rubber consists of a number of steps[2] none of which can be dispensed with and all of which need to be carried out under exact and carefully controlled conditions of pressure, temperature, and time. The treatment with some variations can be applied to any standard type of South American or eastern plantation rubbers. The resulting product shows especially interesting properties, the principal being that it remains soft or highly plastic in storage for indefinite periods in the unvulcanized state, whether compounded or not. This has been proved very conclusively. Eighteen-month old samples of softened latex crepe and of softened ribbed smoked sheets recently tested by standard plasticity methods show little or no regain of hardness; on the same samples various extractions and analysis of the extracts show no change. While the same general statements can be made regarding rubber mixes, the influence of the various compounding ingredients on plasticities must be taken into consideration and the period of time between the first and the ultimate plasticity measurements did not exceed twenty-six weeks. Within that period on mixes not containing materials having continuous influence on the plasticity indices the plasticity as measured twenty-four hours after mixing did not change to any appreciable degree.

As will be shown, this permanently soft rubber can be so compounded and vulcanized as to give finished products equal in all respects to the same products made from standard grades of crude rubber by the usual methods. In many special instances the products made with the proper ratio of this treated rubber are vastly superior. In cases where nothing more than equality is claimed, the advantages in processing prior to vulcanization are obvious and many:

Elimination of the costly power peaks of the initial breaking down period.

Large time gain in mixing and consequential labor and power savings.

Much lower power requirements during actual mixing.

Practical elimination of scorching of sensitive compounds.

Possibility of increase of calendering speed, ease of keeping gage, less scrap to be remilled.

Increase of extrusion speed with less power consumption, less scorching, less scrap to be remilled.

For a given cement viscosity more rubber can be used or less solvent is required per unit of rubber used.

All these listed advantages, thanks to the rubber's high plasticity, result in lower production costs; they can be very directly and exactly measured and be expressed in savings of both overhead and direct costs.

With regard to plasticity, the following may be quoted[3]:

"The softened rubber is, therefore, much softer than masticated rubber. When passed through rolls 10 times . . . the plasticity of the softened rubber was found to be 20 times as much as that of crepe or sheet passed through the rolls 100 times, which is the average amount of rolling required to masticate crepe or sheet. Softened rubber is, therefore, a much more plastic material than can be obtained by ordinary mastication. . . .

"After passing through rolls 50 times a mixture of equal parts of softened rubber and smoked sheets was 14 times as plastic as smoked sheets alone passed through 100 times. Softened rubber can, therefore, be employed as a softener for estate grades of rubber. . . .

"When the softened rubber was mixed without preliminary mastication with 27% zinc oxide, it still had a plasticity which was roughly 20 times that of the corresponding mixing made from crepe or sheet. The mixture extruded very rapidly and smoothly, and only recovered to the extent of 24% as compared with double the amount for the corresponding mixing made from crepe or sheet. In this respect softened rubber compares favorably with reclaim, which also exerts beneficial influence on the recovery of rubber mixings."

The concluding remarks of the paper follow:

"Particularly good results were obtained on vulcanizing a mixture of equal quantities of softened rubber and smoked sheet, and if the price is satisfactory softened rubber[4] many find a market for admixture with crepe and sheet to facilitate the production of a wide range of high class articles, or it may be used without crepe and sheet, where ease of manipulation is of primary importance."

In an American plant where softened rubber (ESSAR) has been in use for over 6 months, power difficulties have been entirely wiped out; in this particular plant all the new rubber used is processed, and after 1½ minutes on the mill it is ready to receive fillers and compounding materials. The maximum initial power requirements have dropped more than 65%, and during the normal mixing the power consumption has dropped more than 90%. Moreover the total mixing time has been cut by more than 66%. As a consequence, where this rubber is used in large percentages, much smaller motors than at present can be used to drive the mills. This same advantage does not obtain through the use of mastication catalysts in concentrated form, as the rubber must, of necessity, form a sheet on the mill before their incorporation; therefore their use does not eliminate the breaking down power peaks. Observations by comparison also show that softened rubber decreases the total mixing time to a much greater extent.

Special mention must be made of the remarkable resistance offered to the absorption of water by compounds

(*Continued on page* 82)

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[1] British patent No. 368,902. German patent No. 573,233. French patent No. 729,268.

[2] *India Rubber J.*, July 10, 1933.

[3] G. Martin, W. S. Davey, and H. C. Baker in fourth quarterly circular of the Rubber Research Scheme (Ceylon), Dec., 1933, pp. 102-109.

[4] Softened rubber, under the trade name ESSAR, is sold exclusively in the United States and Canada by H. Muehlstein & Co., Inc., New York, N. Y.

The Rubber Pendulum

The Joule Effect and the Dynamic Stress-Strain Curve[1]

W. B. Wiegand and J. W. Snyder[2]

THE subject of this paper is of importance in connection with the manufacture of thread, golf balls, and Lastex goods. The Joule effect is of interest in the case of all rubber goods undergoing repeated stresses, such as tires, inner tubes, belting, etc. The work on racking has practical significance in connection with rubber goods for cold climates and in cure evaluation.

The solvent effect described for the first time in this paper is both of theoretical and practical interest, revealing that under "preworked" conditions a rubber solvent may cause contraction of stretched rubber. The effect of solvent in diminishing hysteresis suggests certain practical compounding applications.

The authors point out the importance of recognizing three distinct sections of the stress-strain curve of vulcanized rubber. Of interest to theoretical students is the method here applied of evaluating energy transformation without actual determination of heat transfers.

The combination of evidence derived from the authors' experiments on racking, the Joule effect, and the changes in the dynamic stress-strain curve provide a closer insight into the remarkable changes that occur when a piece of rubber is progressively stretched to the breaking point.—W. B. Wiegand.

NON-MATHEMATICAL selections only are given from the complete treatise. These include description of the rubber pendulum and discussion of the three regions of the stress-strain curve from a thermodynamical point of view. In addition brief reference is made to practical bearings of the subject.

The rubber pendulum is one of two devices which, by employing the Joule effect, constitute rubber heat engines in that they continuously convert heat into mechanical work.[3]

Figure 1 shows the original pendulum.[4] It consists of an ordinary pendulum of slow period fitted with a rubber band, one end of which is attached to the bob; the other to the upright support. This rubber band is stretched to four or five times its original length. Behind the upright is a metal shield so arranged that when the bob has reached the extremity of its swing the rubber band is clear of the shield, during the rest of the oscillation being in its shadow. Behind the pendulum and shield is an electric heating element with a copper reflector. The pendulum is started by displacement from the center toward one or other extremity. As this is done, the rubber band is increased in length. At the extremity of the oscillation the stretched band is exposed to the radiant heat from the element; the Joule effect is brought into play, and the band tends to shrink, thus pulling back the bob. Directly the band moves back within the shadow of the shield it cools, relaxes, and so allows the bob to swing out to the other side. Thereupon the band is once more heated up, contracts, and so repeats the oscillation, which continues as long as the heat energy is supplied. When the electric current is turned off, the pendulum dies down.

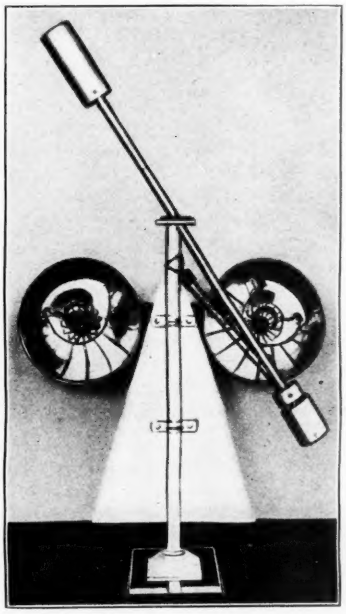

Fig. 1. Wiegand's Rubber Pendulum

The pendulum furnishes a convenient means of visualizing, and to some extent measuring, the thermodynamical implications of the Joule effect; the extent and consequences of "fatigue" in vulcanized rubber; the conditions for, and degree of, reversibility; and the way in which these properties vary with the state of strain, with the temperature, and with other conditions.

Three Regions of the Rubber Stress-Strain Curve from a Thermodynamical Point of View

REGION "A:" THE STEEL SPRING. This region, see Figure 2, extending to approximately 300% elongation for the conditions in the experiments described, is characterized by the comparative absence of heat transfers, relatively complete reversibility or freedom from elastic after-effect, no significant change in internal energy except a small positive value, little or no Joule effect, and, therefore, no availability as a rubber heat engine.

In region "A" rubber behaves very much like a steel spring. The work done by the rubber is represented by the decrease in internal energy without thermal phenomena. With no change in internal energy save that due to the potential energy or work done on the band, there would appear to be no change in inner structure of the rubber.

[1] Abstracted from *Trans. Inst. Rubber Ind.*, Oct., 1934, pp. 234-62.

[2] Binney & Smith Co., 41 E. 42nd St., New York, N. Y.

[3] Wiegand, *Trans. Inst. Rubber Ind.*, 1, 141 (1925).

[4] Now in the Deutsches Museum, Munich, Germany. The assistance of H. F. Schippel, design engineer, B. F. Goodrich Co., Akron, O., in the original construction of both heat engines is here gratefully acknowledged.

REGION "B:" THE GAS (AND THE CRYSTAL). In region "B" the region of the Joule effect, and, therefore, of the pendulum or other heat engine phenomena, there is the maximum of heat evolution, and, on reversal, of absorption; the dynamic element becomes negative and may become very large in proportion to the other energy transformations.

In this region the stress-strain curve suddenly begins to develop a non-reversible condition (large hysteresis loops). The elements of the dynamic stress-strain curve begin to open up and to be inclined sharply to the extension arm of the stress-strain curve.

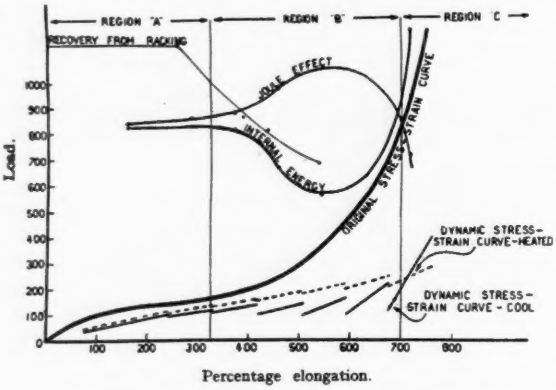

Fig. 2. Thermodynamic Analysis of Rubber Stress-Strain Curve

Region "B" is thus suggestive of profound alterations in the internal structure of the rubber.

REGION "C:" THE FRICTION MEMBER. This region is characterized by the almost entire absence of reversible effects. The Joule effect has disappeared. In this region the force or tension is deeply influenced by the friction component. There is no evolution of heat due to decrease in internal energy of state. In this region increased temperature lowers the stress-strain curve by increasing the plastic flow with ultimate failure by slip or rupture. Region "C" suggests that whatever structural changes have occurred in region "B" have now been completed. It might be called the region of friction, slip, and failure.

A GUESS AS TO THE STRUCTURAL CHANGES. Region "B" is in some respects similar from a thermodynamical point of view to a gas in the sense that the work done is converted into heat, which under suitable conditions may be reversible. If in this region rubber were a perfect analogue of a gas, the total heat evolved would equal the mechanical work done. However this is not the case, as experiments have shown that the heat evolved in stretching rubber in region "B" is greater than the work done.[5]

The authors incline, in the light of the present data, to consider region "B" as one in which the development of intense compressional forces in the rubber induced by longitudinal extension bring about the solidification of a phase of oriented or crystalline nature, accompanied by the evolution of latent heat. If Feuchter's measurements[6] indicating that the density of rubber increases on stretching can be accepted as generally valid, the cross-sectional compression forces induced by longitudinal extension would be still more intense. The higher the temperature the greater the lateral compression required to induce this solidification. The high temperature specimen began to show the separation of the dynamic stress-strain elements at a higher elongation than did the cool specimen.

The facts also suggest that along with separation through lateral pressure of a solid phase, there remains a viscous liquid phase which, directly solidification begins, disposes itself as thin films which become more or less bound, thus introducing a frictional resistance which accounts for the sudden onset of hysteresis at the beginning of region "B."

From this point of view the phenomena in region "C" are readily pictured. At this point solidification is complete with the exception of exceedingly thin films of viscous liquid serving as a bond between the contiguous elements, fibers or, as many would insist, crystals. The rapid increase in load which is characteristic of region "C" would be referable to the well-known rigidity of very thin films of such a viscous cementing liquid. The sole effect of higher temperature in region "C" would then be to cause plastic flow through decreased viscosity of this cement, thus explaining the decreased values for tensiles at rupture obtained and much emphasized by recent investigators.[7]

It is suggested that whereas failure at room temperature may be regarded as rupture of the elastic elements, the failure at, for example, 100° C. may be pictured as rather a slippage due to the phenomena mentioned. In any case it is manifest that attention should not be confined to the properties at failure in the case of enhanced temperatures, but extended to include hysteresis and modulus changes at intermediate elongations. Such values might better be determined on the basis of the dynamic stress-strain curve than only upon the extension arm of an initial hysteresis loop.

[5] Williams, *Ind. Eng. Chem.*, 21, 872 (1929).
[6] *Gummi-Ztg.*, 29, 1167 (1925).
[7] Somerville and Cope, INDIA RUBBER WORLD, 79, 64 (1928).

Para-Graphs

(*Continued from page* 41)

½-inch apart in a row across the width of the material, each row being spaced ¼-inch from the other. Alternate rows are staggered such that the holes are in a line half way between the holes in the row ahead and behind. The perforated combined fabrics are again passed through the squeeze rolls or combiner so that the cut ends of the yarns around each hole are more thoroughly embedded in the uncured rubber. The material is then festooned in a dry heat curing chamber and vulcanized 2½ hours at 250° F. After being cured it is trimmed and ready for manufacture into corsets, girdles, brassières, stockings, instep supports, ankle braces, etc.

UNITING TEXTILE THREADS. The method of uniting a pair of strands is effected by applying to the ends to be united a quantity of rubber latex containing a small amount of a preservative compound. The latex, being in sensitive and unstable condition, will coagulate and unite the strands when rolled and pressed sufficiently.

CONTOURED RUBBER ARTICLES. The method of making a contoured rubber article comprises providing an expansible material, upon which is mounted in contoured form a flexible sheet material, the inner surface design of which it is desired to reproduce in rubber. Next distend the expansible body to mold its outer surface with the design. Then, after removing the flexible sheet, mold a layer of rubber against the matrix surface of the body, remove the layer of rubber, and turn it inside out to present its matrix molded surface as an outer surface of the body.

Effect of Cure

On Some Physical Properties of a High Sulphur-Rubber Mix[1]

R. D. Nutting, Lombard Squires, and C. C. Smith

BEFORE attempting to formulate a comprehensive theory of the vulcanization of rubber with sulphur it is believed essential to have data on a number of physical and chemical properties of the vulcanizate for the entire range of an isothermal cure. The work of Glancy, Wright, and Oon,[2] though fairly complete for the hard rubber range, almost totally neglects the effect of combined sulphur on physical properties in the earlier stages of the cure. While presenting several sets of cures with sulphur coefficients varying as much as from 0.85 to 42.50, the data of Skellon[3] are so scattered as to be of little use for a kinetic formulation. Pearsall[4] obtained correlative physical and combined sulphur data, but again the points are isolated, and the earlier portion of the cure has been neglected. By far the most comprehensive information concerning the coefficient of vulcanization over the entire range of cure is that of Spence and Young,[5] who, however, did not measure the physical properties of the vulcanized rubber.

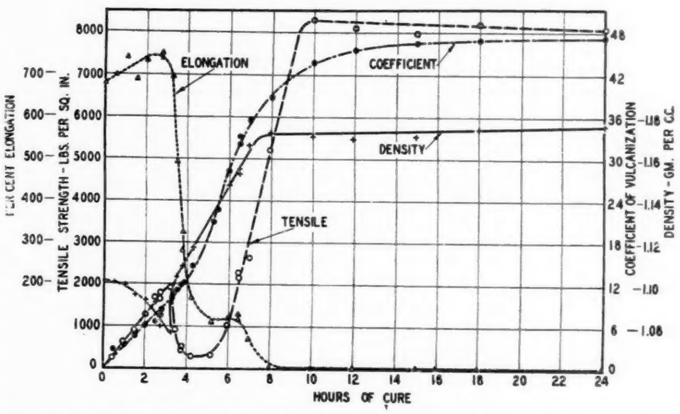

Fig. 1. Variation of Coefficient of Vulcanization, Tensile Strength, Ultimate Elongation, and Density of a 100-Rubber-50 Sulphur Mix with Time of Cure; Temperature of Cure, 287.6° F.

In view of these deficiencies in the existing literature it was decided to cure a mix consisting of 100 parts of smoked sheets and 50 parts of sulphur over the entire range of an isothermal cure, from soft rubber to ebonite, and to observe the sulphur coefficient, tensile strength, elongation, and density of the vulcanized samples.

Experimental

To insure uniformity of the rubber a 250-pound case of first quality smoked sheets was blended on hot rolls and set aside for this investigation. 0.88-pound (400 grams) of the blended rubber were broken down for one minute on a 6-inch laboratory mill maintained at 70° C. and having an opening of 0.055-inch. The speed of the front roll was 24 r.p.m. and of the back, 33.6 r.p.m. as prescribed in the outline of tentative standard laboratory procedure of the American Chemical Society. 0.44-pound (200 grams) of sulphur were added to the masticated rubber in one minute, during which time the mill opening was gradually increased from 0.066- to 0.077-inch to facilitate incorporation of the sulphur. The batch was thoroughly mixed by cutting 6 times across, followed by 6 passages of the rolled stock through the mill. The batch was then

[1] Contribution from the Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.
[2] Glancy, Wright, and Oon, *Ind. Eng. Chem.*, 18, 73 (1926).
[3] Skellon, *J. Soc. Chem. Ind.*, 34, 671 (1915).
[4] Pearsall, INDIA RUBBER WORLD, 77, 70 (1927).
[5] Spence and Young, *Koll. Zeit.*, 11, 28 (1913).

TABLE 1

Stock	Hours of Cure	Coefficient of Vulcanization Sc	Tensile Strength Lbs./Sq. In.	Elongation %	Density Grams per Cc.	Volume of Rubber Sulphide per 100 Grams Original Rubber, Cc.
Rubber	...	...	...	...	0.900	...
Mix	...	...	6.5	680.00	...	...
A-12-1	0.50	2.69	274.0	700.00	1.100	113.1
A-12-2	1.00	3.37	618.0	740 00	1.099	113.6
A-14-3	1.50	4.61	920.0	690.00	1.094	116.8
A-10-2	2.00	6.11	1,256.0	736.00	1.092	115.7
A-12-3	2.50	6.60	1,696.0	760.00	1.091	116.0
A-18-1	2.75	7.43	1,636.0	750 00	1.082	117.8
A-18-2	2.75	8.25	1,780.0	740.00	1,080	118.4
A-21-1	3.25	9.89	1,890.0	695.00	1.077	119.7
A-10-1	3.50	11.01	932.0	493 00	1.103	116.9
A-14-1	3.80	11.87	524.0	325.00	...	...
A-14-2	3.80	11.99	422.0	280.00	1.108	116.9
A-20-1	4.25	14.61	320.0	165.00	1.117	116.9
A-20-2	5.20	20.93	340.0	110.00	1.135	117.9
A-21-3	6.00	28.02	1,000.0	120.00	1.146	120.3
A-20-2	6.50	32.07	2,196.0	126.00	1.152	121.4
A-21-2	6.50	33.24	2,204.0	119.00	1.154	121.8
A-22	7.00	35.34	2,615.0	70.20	1.166	121.8
A-11	8.00	38.57	5,170.0	2.58	1.172	122.4
A-16	10.00	43.56	8,250.0	3.06	1.170	124.9
A-13	12.00	45.30	8,040.0	3.42	1.169	125.9
A-17	15.00	46.31	7,940.0	3.54	1.170	126.3
A-15	18.00	46.70	8,150.0	4.06	1.173	126.3
A-19	24.00	46.82	8,040.0	3.81	1.175	126.1

sheeted out to the proper thickness required by the mold and allowed to stand at least 12 hours in darkness before being used.

Curing was effected in a 2 platen, steam heated, hydraulic press at 2,000 pounds per square inch and 287.6 ± 0.2° F. The steel molds for curing were of the plate and frame type having chromium surfaces on the plates. Cures up to 7 hours were made in a frame with 4 cavities, each 6 by 6 inches by 0.09-inch; whereas the hard rubber cures were made in an 11 by 11 inches by 0.11-inch, single cavity frame. This large size was to facilitate the production of tensile test pieces of sufficient length to be used for hard rubber testing. To obtain a smooth, unpitted surface on the hard rubber, capable of careful gaging for tensile measurements, the uncured samples were subjected to pressure in the cold press for about 15 minutes, and aluminum foil was placed between the rubber surface and plates for curing. The reasons for these precautions were that the cold pressing tended to eliminate trapped air while the foil adhered to the rubber surface as the volume decreased during vulcanization and maintained the desired smooth surface.

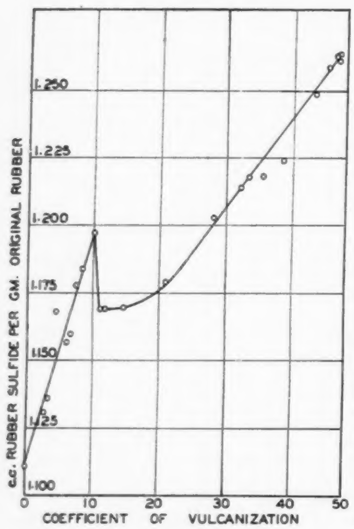

Fig. 2. Volume of Rubber Sulphide as a Function of Combined Sulphur

Accuracy in timing the start of the cure was aided by warming the steel molds in the press for 15 minutes before the rubber was placed within them. The start of the cure was arbitrarily taken as the time when the full 2,000 pounds hydraulic pressure had been applied to the press, and the end when the pressure was released. At the conclusion of the cure the molds were plunged into cold water.

Dumbbell shaped test pieces were died out from the 6-inch soft rubber slabs (those cured less than 7 hours) 24 hours after the end of the cure, and the stress-strain diagram determined on a vertical rubber tester.[6] Test specimens of dumbbell form were milled from the 11-inch squares of ebonite (cures of 7 hours or longer) and their stress-strain characteristics studied on a vertical wire machine of a special type.[7] These samples were 11 inches in length with a 3½-inch constricted center portion of ½-inch width. The ends of the sample were ⅞-inch in width for 3 inches of length to permit clamping in the jaws of the machine. The reducing sections were arcs of circles of 1¼-inch radius, tangent to the center portion of the sample. Elongation between 2 lines scratched on the constricted portion 3 inches apart was measured to 0.005-inch with dividers. The jaws of the machine separated at a rate of 0.19-inch per minute for the 7-hour cure and at 0.10-inch per minute for all longer ones. All tensile test pieces were cut lengthwise (in the direction of mill grain) from the sheets. At least 5 specimens were tested for each cure, and the minimum number for those cures of less than 7 hours was 13.

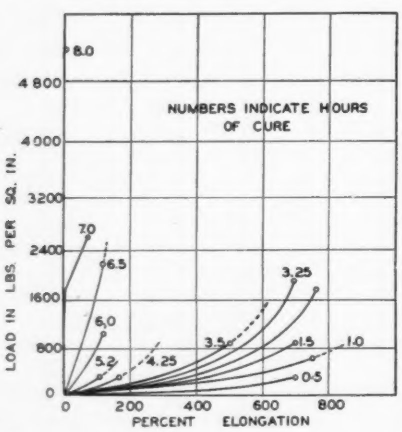

Fig. 3. Stress-Strain Relation for Soft and Intermediate Rubber; Tested at Room Temperature

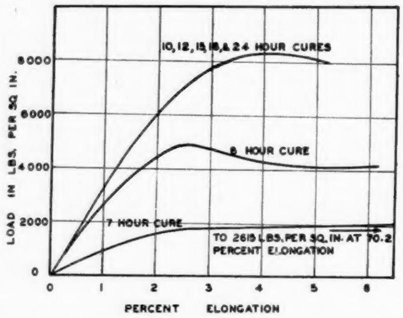

Fig. 4. Stress-Strain Relation for Hard Rubber; Tested at Room Temperature

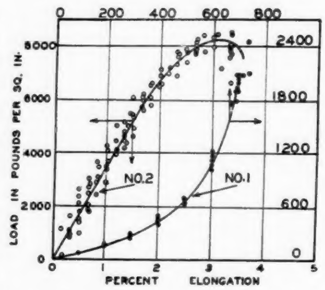

Fig. 5. Typical Stress-Strain Relation for Soft (No. 1) and Hard (No. 2) Rubber Showing Experimental Variations; Tested at Room Temperature

The free sulphur was determined as prescribed by the Rubber Division of the American Chemical Society, and the coefficients of vulcanization[8] were calculated from the difference between the original free sulphur in the mix (by analysis) and that remaining after cure. Many of the combined sulphur points were checked by making additional analysis on the cured sample before and after extraction in a Parr sulphur bomb. The amount of sample used in the acetone extraction was such that between 1.0 and 1.5 grams of barium sulphate were precipitated.

The changes in density of the rubber during cure were obtained by weighing the samples in air and in water.

Results

The summarized data are given in Table 1 and shown graphically in Figure 1. The density curve of Figure 1 shows the variation in density of the cured sample with time of cure taken from column 6 of Table 1. Column 7 of Table 1 gives the change in volume of rubber sulphide per 100 grams of original rubber with time of cure. This column was calculated by correcting the volume of that weight of cured sample corresponding to 100 grams of original rubber for the volume of free sulphur, density 2.045, that it contained. These results are plotted in Figure 2 against the combined sulphur. Figure 3 shows the variation in the stress-strain relationship with time of cure for the soft and intermediate rubber range. Figure 4 gives the same data for the hard rubber range. It is to

[6] Henry L. Scott Co., Providence, R. I.

[7] Developed by the M.I.T. Department of Mechanical Engineering.

[8] Coefficient of vulcanization $= \dfrac{\text{parts of combined sulphur}}{\text{100 parts of rubber}}$

be noted that all cures above 10 hours fall on the same curve within the experimental error. Figure 5 shows examples of 2 of the cures of Figures 3 and 4, indicating the range of experimental variation that was encountered in these determinations.

One of the most interesting results brought to light by this investigation was the variation in density of the sample with time of cure.[9] The densities of the samples were determined in an effort to explain the marked pitting of the sample which took place in the hard rubber cures. Preliminary experiments had shown that when the hard rubber samples were cured in a rigid steel mold, the surfaces were always covered with pits and indentations, making it impossible to obtain specimens suitable for stress-strain determination. A cursory search of the literature revealed no previous explanation for these phenomena. Two causes of the pitting might be assumed. It might be postulated that the entrapped and dissolved air together with the hydrogen sulphide which is always formed in the vulcanization of hard rubber might be forced out of the sample at some stage during the cure and not be able to escape from the mold. However it was difficult to see why this effect should give a uniform pitting action over the entire surface and not be concentrated at a corner of the mold which might be higher than the others. Furthermore the pits had not the character of air pockets or bubbles, but were much wider and shallower and, on the whole, less uniform than might have been expected from trapped gas.

These considerations led to the conclusion that the effect was probably caused by shrinkage of the sample when it entered the hard rubber stage, and the subsequent determination of the density (at room temperature) confirmed this. Figure 1 shows that in the early soft rubber stage of the cure the rubber sample actually swelled. When the intermediate rubber stage is reached, the density of the sample abruptly begins to increase and rapidly reaches a value at which it remains constant throughout the remainder of the cure. However it is to be noted that the start of this abrupt density increase occurs at a point where the rubber has lost practically all of its plasticity, i.e., in the intermediate rubber range. The rubber is therefore incapable of adjusting itself to level out the inequalities produced by the shrinkage unless it is subjected to pressure. The heavy steel plates used in the first experiments were not sufficiently flexible to allow the rubber to even out these inequalities. However, when the rubber was placed between thin aluminum sheets and the maximum hydraulic pressure applied when the rubber became more dense, i.e., in about 3 hours, the combination of the increased flexibility of the aluminum sheet and the sudden increase in pressure was sufficient to form a uniform smooth surface although the rubber sheet was thinner in the center than at the edge near the mold. This procedure enabled the cross-section of the specimens used in the tensile strength measurements to be determined with sufficient precision.

[9] The change in density with time of cure has been pointed out by Glancy, Wright, and Oon.[2]

Annals of Rubber[1]

Chronological Record of the Important Events in the History of Rubber

1845. The incompleteness of the records of the Patent Office with relation to all inventions in the preceding years is slightly offset by the statement of the commissioner of patents, formulated in a general *résumé* of the progress of the several industries of the country. He states that the great value of caoutchouc in the arts has led to a great variety of devices to overcome the difficulties experienced on its first introduction; a speedy mode of dissolving and a practical method of drying the solution. He states that no solvent has been obtained better than caoutchoucine, a liquor prepared by the destructive distillation of the caoutchouc itself, but the great expense of the solvent precludes its permanent use. At present a turpentine is generally used as a most economical solvent. With turpentine came another difficulty, but that was obviated by the use of sulphur. There have been quite a number of patents taken out, relating to corrugated, or shirred fabrics, and suspenders or straps. These inventions consist of stretching threads of india rubber to their utmost tension, inclosing these threads between two layers of cloth, the layers adhering by means of india rubber cement, and the whole being passed between heavy rollers, which securely prevents separation. The fabric is firm and, when dry, the threads contract, which draws the cloth into wrinkles, hence the corrugation, or shirring. Much use of this material was made in shoes and slippers, and the congress boot of today is a descendant.

The commissioner further states that india rubber was largely used in that day in surgical instruments, life preservers, gas-holders, varnishes, pavements, and roofing. At that time trees had been planted in Florida for the growth of caoutchouc, and the commissioner expressed the hope that those trees would prove fruitful.

In this year James Bogardus patented machinery for corrugating, which consisted of two sets of feed wheels which admit of the turning of the material back to stretch the strips of india rubber. This movement is combined with pressure rollers, the peripheries of which move with greater velocity than those of the feed.

The imports of gutta percha into England during this year amount to 20,600 pounds; in 1848 they were 3,000,000, and in 1852, 30,580,000 pounds. An imitation of gutta percha was later found in the juice of the Mudder tree, which answered for a great many purposes, but for insulation it failed entirely, proving a fair conductor; another imitation was called gutta, which was the inspissated juice of an Artocarpus. The factories at Naugatuck, Conn., owned and operated by the Wales Goodyear people, were built. The Boston Belting Co. was incorporated in this year although its factory in Roxbury had been in operation since 1828. Smooth surface belting first came into use about this time.

1845. Robert William Thomson was the first patentee of the pneumatic tire. His patent, issued in England as No. 10,990 of 1845, related to "the application of elastic bearings round the tires of wheels and carriages rendering their motion easier and diminishing the noise they make while in motion." A French patent was issued to Thomson in 1846, and one in America in 1847.

1845. Golf balls first manufactured of gutta percha were molded with smooth surface.

(To be continued)

[1] Continued from INDIA RUBBER WORLD, Feb. 1, 1935, pp. 39-40.

EDITORIALS

The President and A. F. L.

WHEN President Roosevelt renewed the automobile manufacturing code last month, the American Federation of Labor was extremely exasperated because the demands of organized labor were completely disregarded in the code renewal negotiations. Following a meeting, initiated by union leaders, at the White House, the President issued a statement intended to clarify his attitude toward unionized labor. He said in part:

"The American Federation of Labor has been helpful and cooperative in the development of the programs for the rehabilitation of industry and of our economic life over the past two years, and I hope their cooperation will continue active and effective.

"The Federal Government has indicated through the National Industrial Recovery Act its desire that labor and management organize for the purposes of collective bargaining and the furtherance of industrial peace and prosperity, but the Federal Government cannot, of course, undertake to compel employes and employers to organize. It should be a voluntary organization."

The Thirty-Hour Week

DRASTIC reduction in work hours is unavoidable if the nation's unemployment problem is to be solved with satisfaction to all concerned. Such is the claim of organized labor.

A recent report on the thirty-hour week by Harold G. Moulton, president of the Brookings Institution, presents an unbiased view of this movement and analyzes its underlying philosophy.[1]

Official statistics show that the peak production capacity of this country is inadequate to supply satisfactory standards of living to everybody and that the effect of the thirty-hour week on the production of wealth would be less wealth to be divided.

Factors ordinarily overlooked in estimating production include increased efficiency in man-hour productivity between 1929 and 1934, resulting somewhat from the fear of losing one's job when jobs were scarce, and gains which came from a selective process in choosing personnel as less efficient and undertrained workers were removed from payrolls with the duration of the depression. At best, manufacturing industries account for only about 20 to 25% of the value of the total national output of goods and services, and experience has shown that under the NRA larger payrolls resulting from shorter hours do not increase the proportion of the total output of industry going to the masses. Rising wage rates increase costs and prices, and where the latter advance, the relative share going to profits may be maintained or even augmented.

Even if all those now unemployed were put back to work, there would not be a direct proportional increase in output because of lack of efficiency and experience for the particular tasks in hand, and the actual result for some time might be a real decrease in total production. The material advance in costs would certainly tend to lessen sales which, in turn, reduces production, with the inevitable result of less, rather than more, employment. Indeed, in the light of experience, it would seem reasonable that a further drastic curtailment of the working week would be followed by a commensurate increase in the price of manufactured commodities, which might well be more pronounced than has been the case under the codes.

The conclusion is inevitable that the proposed measure would not promote national welfare. There is a rumor that the President is decidedly unfavorable to the suggestion, but in this he must have the support of an informed public if it is to avoid this further burden.

[1] *Ind. Eng. Chem.*, Jan., 1935, p. 4.

A Warning to Our Readers

A FRAUD that may increase in seriousness, if not promptly disclosed, was recently perpetrated in a midwestern city by a young man who sold 3 years' subscription to INDIA RUBBER WORLD for $4.00. The fraud is obvious from the fact that the annual subscription is $3.00, and for 3 years it would be $9.00.

We take this opportunity to advise our readers that only responsible solicitors or well-known agencies are authorized to solicit INDIA RUBBER WORLD subscriptions. However we prefer to act as our own subscription agent and prefer to solicit subscriptions by mail. Like all leading trade journals, we do not resort to the methods employed by magazines of a more general character.

The appeal of our journal is to the rubber and allied industries. Whatever may be a firm's interest in rubber or manufactured rubber goods, and all matters pertaining to them, it will be found on investigation that INDIA RUBBER WORLD is the one periodical covering these subjects adequately.

We, therefore, urge direct dealing between ourselves or accredited agencies and suggest that both new subscriptions and renewals be sent through these channels in order that there may be no possibility of loss or delay.

What the Rubber Chemists Are Doing

Restraining Vulcanization in Rubber Manufacture[1]

D. F. Twiss and F. A. Jones

IN PRESENT-DAY rubber manufacture the difficulty is met that accelerated mixings are expected to withstand various processing operations frequently involving temperatures only a little below that at which the mix is to be vulcanizable. A further difficulty of a somewhat different type is encountered when very thick articles such as solid tires are being produced. Here a large bulk of rubber is expected to vulcanize in a reasonably short time, and as the rubber is a comparatively poor conductor of heat, the outside of the article rises in temperature much more rapidly than the inside and so may tend to relative over-vulcanization.

With the introduction of more and more powerful accelerators the difficulties attending manufacture have grown correspondingly. If a batch of compounded rubber commences to vulcanize even slightly during processing, the batch will become very difficult to manipulate, even if not quite unmanageable. Further, scrap so produced may be almost valueless on account of the difficulty of restoring it to a form suitable for further use. Accelerated scrap also cannot be mixed indiscriminately with stocks containing other accelerators without serious risk of trouble.

Delayed-action Accelerators

Considerable advance has been made in the ordinary method of compounding technique with respect to scorching: namely, by the development of delayed-action accelerators and anti-scorch agents. With a true delayed-action accelerator vulcanization should not occur until a certain period of time has elapsed, after which rapid vulcanization takes place. The existence of this time lag can be explained on the basis that the reputed accelerators are inactive, but on heating are decomposed into other substances which constitute the real accelerators. Some organic accelerators give a temperature lag, and although comparatively safe from prevulcanization in processing, they vulcanize only above a certain critical temperature. Hence, when the rubber mixture is heated, vulcanization does not take place until this temperature is attained. Such accelerators are not delayed-action accelerators in the narrower sense. In all organic accelerators the activity can be associated with a particular grouping and, in the simplest form of accelerator, generally with a particular hydrogen atom. Most, if not all, delayed-action accelerators can be regarded as chemical derivatives of known powerful accelerators in which the place of the active hydrogen atom is occupied by a more or less easily displaceable organic grouping; the delayed-action accelerator is consequently often a compound, for example, of the thio-ester or thio-ether or even thioanhydride type, which itself strictly is not a vulcanization accelerator, but is capable of undergoing hydrolysis or fission with formation of one.

The accelerators of the ultra or semi-ultra type which need restraining are almost entirely the dithio-acids and the mercaptobenzthiazoles. The former class comprises more particularly the alkylxanthates and the dithiocarbamates and the corresponding thiuram sulphides derived from various secondary aliphatic amines including piperidine. The latter class is represented by 1-mercaptobenzthiazole itself, its substitution products, and the corresponding benzthiazyl sulphides.

One group of delayed-action accelerators comprises the esters, especially the aryl esters, of the dithio-acids; also the esters of the mercaptobenzthiazoles with various organic acids. These esters are commonly not produced by direct esterification, but by available convenient methods of metathesis or double decomposition.

For fairly obvious reasons every derivative of an ultra-accelerator in which the active responsible group is weighted by a substituent will not necessarily be a good accelerator for manufacturing purposes. Manufacturing requirements, in any case, are so diverse that no one accelerator will satisfy all needs.

The temperature above which the weighted accelerator undergoes such fission is often termed its critical temperature; in general, the higher this temperature is, the safer the accelerator is in processing. A delayed-action accelerator so slow as to be in itself of little practical interest may in some cases be capable of giving a valuable active combination in the presence of an accelerator of a different sort, which may not only facilitate reconversion into the accelerator proper, but may also lead, with this, to the development of the well-known enhanced activity known as the two-accelerator effect. A mixture of the dinitrophenyl derivative of mercaptobenzthiazole (dinitrophenylbenzthiazyl sulphide) with diphenylguanidine is a well-known instance and is widely used.

Such mixtures are often not only much quicker curing than either ingredient separately at higher temperatures, but can possess a higher critical temperature than either constituent alone or than a simple mixture of the two unaltered parent accelerators. It is well known of course that organic bases such as diphenylguanidine increase the accelerative activity of mercaptobenzthiazole itself, but with these mixtures there is generally marked proneness to scorching.

The tendency of an accelerator, whether single or mixed, or even chemically modified, to cause scorching bears little relation to the actual magnitude of maintained acceleration. Thiocarbanilide, one of the earliest organic accelerators to be used, would today be regarded as relatively slow, but it has very marked tendencies to pre-vulcanization and scorching.

A simple test for the comparison of the critical temperatures and degree of delayed action consists of heating a standard mixing containing the accelerator and noting the time necessary for incipient vulcanization at various temperatures. A convenient standard mixing consists of rubber 100 parts, sulphur 5 parts, zinc oxide 5 parts, accelerator one part. A pellet of the mixing weighing approximately one gram is heated under glycerin in a glass tube. This in turn is immersed in a larger glycerin bath maintained at the desired temperature. The consistency of the pellet is observed carefully by pressure with a glass rod; when incipient vulcanization occurs, the pellet becomes harder and slightly elastic. The test is conveniently made at three temperatures, 100°, 120°, and 140° C.

Typical comparative results obtained appear in the table on the next page. For an accelerator of practical value, incipient vulcanization at 140° must occur in a short time because vulcanization is commonly effected near this tem-

[1]Abstract of article published in *J. Soc. Chem. Ind.*, Jan. 18, 1935, pp. 14 to 18T.

Accelerator	Time Required for Incipient Vulcanization at		
	100°	120°	140°
Zinc *iso*propylxanthate	4½	2½	1½
Zinc diethyldithiocarbamate	9	4½	3½
Tetramethylthiuram disulphide	31	9	3½
Tetraethylthiuram disulphide	34	10	5
Mercaptobenzthiazole	31	10	5
Diphenylguanidine	40	9	5
Hexamethylenetetramine	37	15	7½
Dinitrophenyl benzthiazyl sulphide 2 pts. + diphenylguanidine 3 pts. ("Ureka")	33	10	4
Dibenzthiazyl disulphide	>60	>40	7½
Aldehyde-ammonia	45	11	7
Crotonaldehyde-aniline	20	8	4
Piperidine piperidine-1-carbothionolate	5	3	2½
Benzthiazylthiodiamylamine	40	12	5
Thionfuroylthiodiphenylguanidine	>60	·23	6
Phenyl piperidine-1-carbothionolate	—	—	17

perature. If accelerators are very slow at 140°, their accelerating effect is not likely to be of practical importance. It is possible to compare the accelerating qualities and scorching tendencies of experimental substances of which only a small quantity is available. Several accelerators can be tested concurrently by using separate glass tubes heated in the same bath. Reproducible results are easily obtained after a little experience.

When carrying out the test at 100°, it is hardly necessary to carry the heating time beyond sixty minutes, because if an accelerator gives no sign of pre-vulcanization in this time its scorching behavior may be regarded as good. To be of practical interest it must, of course, vulcanize satisfactorily at higher temperatures.

Antiscorch Agents

Antiscorching agents delay vulcanization at temperatures at which mixing, calendering, extruding, etc., are carried out, but exert little influence at the vulcanization temperature proper. Such agents should be free from other complications; they should not affect the color of the mixing or impair the aging properties of the rubber. They should be practically free from odor and be so active that only very small amounts are required to give the desired scorch-retarding effect. They should have no adverse effect on the physical properties of the vulcanized rubber.

Free acids and their anhydrides are effective antiscorching agents and can be added to the rubber mixing in a variety of ways. They may be first combined with a basic accelerator such as diphenylguanidine. They may alternatively be added directly in powdered form. Results obtained by the scorching test using pellets of rubber mixing heated in glycerin follow. Mixing: rubber 100 parts, sulphur 5 parts, zinc oxide 5 parts, mixture of dinitrophenyl benzthiazyl sulphide (2 parts) + diphenylguanidine (3 parts) one part, acidic antiscorch agent one part.

Acid Used	Minutes Required for Incipient Vulcanization at		
	100°	120°	140°
Citric	>60	48	10
Tartaric	55	24	8
Lactic	58	27	10
Succinic	55	15	8
Oxalic	58	29	11
Sebacic	45	21	7
Adipic	50	26	7
None	35	11	6

On account of their sparing solubility in rubber the above acids, when added in powdered form, are difficult to incorporate uniformly. Phthalic anhydride, which has been marketed commercially as a vulcanization restrainer, also shows this disadvantage.

Benzoic acid dissolves in rubber much more readily. A mixture of this acid with zinc oxide has also been marketed as an antiscorch agent (under a proprietary name). Unfortunately marked solubility in rubber, although facilitating uniform dispersion, often gives rise also to the serious disadvantage of blooming on the surface of the vulcanized rubber.

If, however, some of the above acids which are not dissolved by the rubber are combined with a basic substance such as aniline, a much better dispersion can be effected, and at the same time the antiscorch properties of the acids themselves are still observable.

The demand for shorter periods of vulcanization is natural in view of the need to apply expensive equipment to the greatest possible output with the smallest over-all cost. The need of a method of acceleration which will not be operative at processing temperature, and yet will be very active a few degrees higher, is a real one; whether or not this need will be first met with an accelerator with an ideal "trigger" action or by an ideal restrainer, or by some combination of these or some new principle, the result, when attained, will be of great importance. The difficulty of the problem is increased, however, by the constant need to bear cognizance of other correlated effects, particularly the various physical properties of the vulcanized products. The above requirements are more or less peculiar to the manufacture of rubber by dry methods, and even here occasionally scorching accelerators may be demanded for special purposes. In latex technique the need of a delayed-action accelerator rarely is likely to be encountered seriously.

Aresklene

Aresklene is an alkylated and sulphonated aromatic compound in liquid form containing approximately 50% by weight of active material in water. Because of its wetting properties it is of value as an auxiliary mold dope or lubricant. Thus 0.25 to 0.50% of Aresklene in soft water will loosen high grade stock from the mold and give the articles shinier surfaces.

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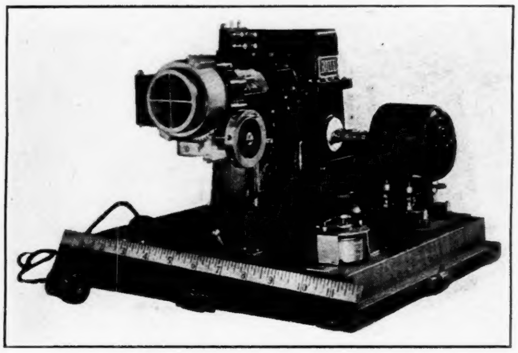
(*Continued on page* 80)

New Machines and Appliances



New Model Royle Strainer

Improved Strainer Head

THE operating advantages of the improved rubber strainer here illustrated center chiefly around the improved means for attaching and opening the strainer head. Formerly the strainer head and gate were bolted together, causing considerable delay and labor in making changes, not to mention the liability of accident to feet by falling nuts or bolts.

In the latest design the head is attached to the body of the machine by means of a bayonet joint, which is swung in and out of engagement by a rack and screw operated by handwheel. The screen gate is hinged to the head and locks to place by a bayonet joint ring turned by hand.

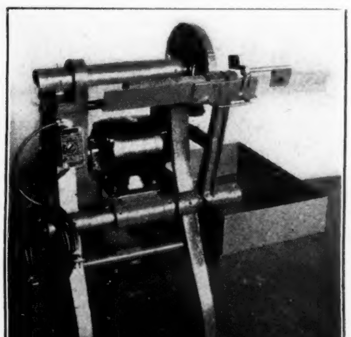
Royle strainers have gone through a wholesome evolution of head types, including the three-way cylindrical and divided cylindrical. All have their merits, but are now superseded by the strikingly efficient expansion type with quick opening gate front and enlarged screen area. The usual churning of stock with consequent generation of heat does not occur in the expansion type head in which the stock expands to fill the cavity and moves forward with minimum friction in the form of a cone with its base against the screen. A compound helical or herringbone gear drive is used in the 8½-inch Super-Perfected straining machine. Pinion shafts are mounted in roller bearings, and all parts of this driving mechanism are continually flushed with cool oil by an automatic splash and gravity system. John Royle & Sons, Paterson, N. J.

Rubber Sample Cutter

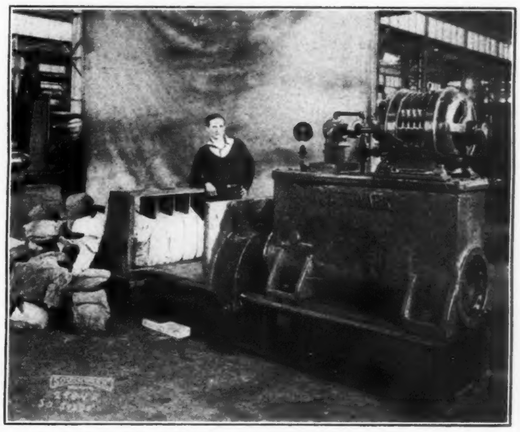
THE simple and very convenient rubber cutting mechanism shown in the illustration is designed for sectioning samples, or it can be used for cutting uncured pieces of rubber for use in filling molds. It will cut cylindrical stock 2¼ inches in diameter and rectangular stock of 2 by 2¼ inches cross-section.

The machine is of sturdy construction, comprising a shaft direct connected to a ½ h.p. single phase motor and at one end carrying a 10-inch diameter cutting disk. A shaft journaled to the front of the machine frame supports a bar to which is fastened an angle iron trough for holding the rubber stock to be cut. A stop gage attached to the stock trough is slidably adjustable for regulating the length of the cut pieces.

The machine is operated by pushing the trough toward the revolving disk until the stock is severed and falls into the box located below to receive it. This machine is one of much practical utility, especially where pieces of large, dense composition require to be cut for molding and also for cutting samples of heavy ply hose. Wm. R. Thropp & Sons Co., Trenton, N. J.



Thropp Sample Cutter



Southwark Rubber Bale Shear

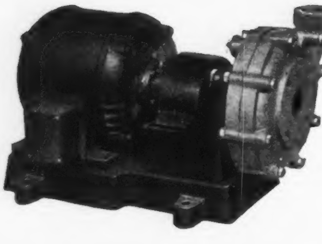
Hydraulic Bale Cutter

THE rubber bale shear here described and illustrated consists essentially of a horizontal table, having at one end a rectangular box containing four crossed knives—the cutter proper. At the other end of the table is a horizontal ram and cylinder, a liquid supply tank, and a motor driven pump for the development of pressure in the fluid. The ram has a large plane vertical face, which is grooved with a medium coarse grating, to prevent side shift of or vertical lift of the bale in cutting. The working space between the ram-head and the cutter box is entirely open. There are no rods, bolts, or other impedimenta to retard the operation of placing a bale ready for cutting. The bale may be handled into the machine from above or from either side with equal facility and celerity. With the bale in place a simple movement of a lever admits fluid under pressure to the ram; the head advances; the bale is pushed forward through the cutter box, dry, and ready for the macerating mill, to which they usually go by gravity and without further handling.

After the operator moves the lever to start the cycle he is free to prepare the next bale for cutting as the machine, after pushing the bale through the cutter box, returns automatically to the initial position, in readiness for the next cycle. The conversion of 80, 24- by 19- by 19-inch bales per hour into 640 pieces, is accomplished by this machine and one man. Baldwin-Southwark Corp., Southwark Division, Philadelphia, Pa.

Automatic Timing Clock

TIMING control of machinery and processes is frequently as essential as temperature control for insuring



American Hard Rubber Centrifugal Pump

Walser Automatic Timer

uniformity of product and capacity output. This fact is fully appreciated in many lines of industrial practice including rubber.

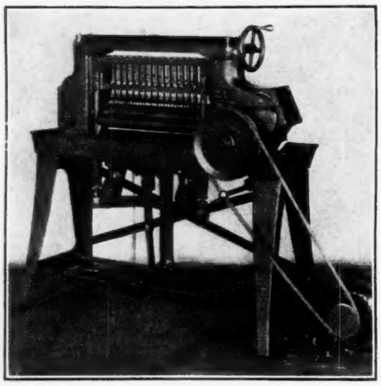
The illustration pictures one of several types of automatic timers, which is not a clock although a clock movement is used for the timing control. These movements, built especially for the purpose, are of heavy rugged construction. The escapement ratchet and lever are cut so as to prevent stopping or locking and assure starting when the switch is turned on and the clock set for operation.

Timer operation is simple. Turning the pointer to the time interval desired closes the switch (or opens it when so wired) which will open automatically, after the set time has elapsed. For very short intervals the pointer must be returned for setting after the switch has been tripped. Settings can be changed at will, forward or backward, without affecting the timing mechanism. A patented friction device on the center arbor permits resetting of the pointer. As the movement requires no winding, it cannot run down.

These timers combine both ruggedness of construction with accuracy of timing. Walser Automatic Timer Co., Chrysler Bldg., New York, N. Y.

Hard Rubber Pump

THE picture represents a new type of hard rubber centrifugal pump considered by its makers the finest in the non-metallic field for medium capacities up to 90 gallons per minute at 12-foot head. Every feature of the design has been worked out carefully on the basis that ability to handle acids and corrosive chemicals without difficulty is the first requisite. The casing of this pump is made of acid resisting hard rubber and is also heat and distortion resisting. It is mounted to the base by means of acid resisting hard rubber covered casting which acts as a chamber to catch drip from the stuffing box. By-pass is adjustable and cored right into back casing. The motor shaft is especially extended, tapered, and pinned into the pump shaft with all parts interchangeable. American Hard Rubber Co., 11 Mercer St., New York, N. Y.



Lux Tire Splitter

Tire Splitting Machine

THE motor operated splitting machine pictured was designed and built especially for splitting tires. It works with automatic feed and a reciprocating knife with automatic water lubrication. The feed roll regulates the speed with relation to the knife. The machine is provided with a quick knife changing arrangement and will slice off rubber or split tires on any ply in one operation. It will split a 30- by 5-inch tire in 45 seconds. The splitter has small individual rollers above to take care of any high or low spots on the tread of a tire, thus preventing the knife from gouging the material. The main bearings are oiled automatically, and the gears by an enclosed splash system. A grinder for the knife is furnished with the machine. Lux Machine Co., Minneapolis, Minn.

New Molding Process

A NEW electro-phenolic deposition process was developed recently whereby durable metal molds for rubber articles of intricate and undercut design can be made with absolute accuracy of reproduction, and with relatively low time and cost requirements; the latter advantages rapidly increase in attractiveness as the required cavities increase in number.

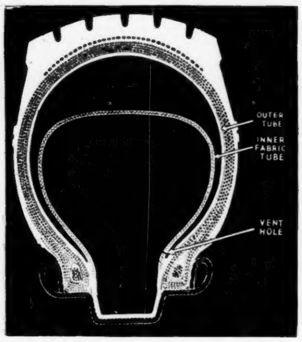
A soft rubber negative or mold, with dowel pins properly located, is press cured around the desired article or its model. This is removable without distortion regardless of intricacies of design and undercuts because of its flexibility. With this as a pattern, a wax cast is made with overflow grooves and dowel fittings. The wax casting is then surfaced with a gild-like sensitized coating by a patented process of high frequency discharge in a vacuum cabinet. With a newly developed electrical deposition process hard dense metal is plated on the sensitized casting from a phenolic solution to form a strong, thick, but evenly gaged shell, the inner or cast contacting surface of which is to become the finished mold cavity.

Neuman Studio

Process Mold Parts and Fabricated Animals

Shells made in this manner are then arranged face down in a casting box and backed with a zinc-copper alloy having a compressive strength equal to that of a high grade semi-steel casting. The physical operations of this phase of the mold making procedure are the same as those for making soft metal molds, except in this case the shell, which serves as a matrix, becomes an integral part of the mold and forms the cavity itself. The manufacturer is Process Molds, Inc., Fort Wayne, Ind.

New Goods and Specialties



Lifeguard Inner Tube Cross-Section

Lifeguard Inner Tube

A NEW automobile inner tube has recently been developed and is intentionally designed to prevent loss of car control when a tire blowout occurs while the car is traveling at a high rate of speed. It is a double-tube construction, one inside the other, and both joined at the base. The outer one is like the conventional inner tube in size, shape, and composition; while the inner and smaller one consists of plied-up rubberized cord fabric through which is a small hole. Air introduced through the regular valve first fills the inner tube, then leaks to the outer one until the pressure is equalized in both; then the former floats free.

When a casing blowout occurs, only that air in the outer chamber escapes suddenly, that of the inner chamber escapes slowly through the vent hole, thus producing the effect of a slow leak which permits full control of the car until it can be stopped. Goodyear Tire & Rubber Co., Akron, O.

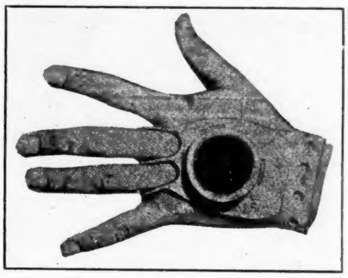
Rubber Lined Umbrellas

LEADING Fifth Avenue shops are featuring women's umbrellas of rubber lined pure silk crepe-de-chine in the season's smartest colors, including white. The handles, all quite handsome, appear in many designs of the straight, crooked, or traveler types in galalith compositions.

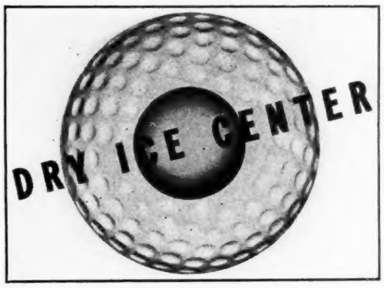
Dry Ice Center Golf Ball

THE latest development in golf ball manufacture is the dry ice center, for which many advantages are claimed. In the making of the ball, after the pure rubber core is filled with its special liquid, a small, precisely calculated pellet of dry ice is inserted and the hole instantly sealed up. The dry ice at once begins its chemical efforts to resume its original gaseous form (CO_2). This carbon dioxide expands so rapidly that it quickly "pumps up" the liquid center. This action is termed "compressed expansion."

The uniform expansion of the carbon dioxide increases the tension of the winding and produces a center of super resilience and absolute sphericity. Besides it has none of the disadvantages common to hard center balls. The greater a golf club distorts it, on impact, the quicker it springs back into shape and the farther it goes. The dry ice center also achieves greater accuracy because the center is equally expanded in all directions. It is said never to be "out of round," lop-sided, or unbalanced. Crawford, McGregor & Canby Co., Dayton, O.



Rubber Hand Carried Signal



Macgregor Pace-Maker

Gold Seal Tape

JENKINS BROS., Bridgeport, Conn., has announced a complete line of friction tapes and splicing compounds including regular commercial grades as well as material to meet the most exacting specifications. The commercial tapes and splicing compounds are trade named Gold Seal.

This friction tape is said to be strong, tacky, free from pinholes, non-raveling, and the possessor of high insulating qualities. The tape will remain tacky a long time, the manufacturer states, because there is plenty of live rubber in the friction compound which is thoroughly impregnated into every fiber of cloth. Gold Seal splicing compound is a high-grade rubber insulating tape that fuses instantly and becomes one solid mass to assure a perfect splice and complete protection.

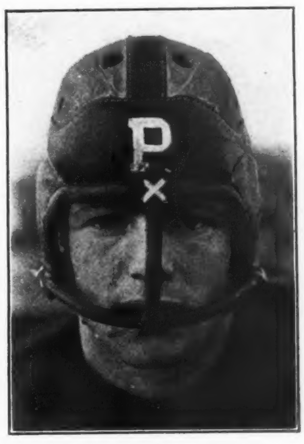
Hand Traffic Signal

AT NIGHT or in bad weather a motorist who signifies his intention of making a turn by putting out his hand often runs the risk of not being seen. Serious accidents thus can frequently result.

But now is offered a recently patented device to eliminate this danger. The product, known as the Hand Carried Traffic Signal, is of rubber in the form of a half glove which is worn on the back of the hand. Fitted to the glove is a red reflector of Bohemian glass that is lighted by the headlights of the cars behind the driver as he puts out his hand to signal a turn or a stop. Irving Lieb, 145 Landers St., San Francisco, Calif.

Football Nose Mask

EVERY effort is being taken to guard football players from further injury. A recent development designed especially to protect a member of the team with an injured or broken nose or damaged face is the mask illustrated herewith. This is made of ¼-inch round steel with plates at three points where the mask laces to a player's helmet. It can be transferred from one man's headgear to another's and thus eliminates the need of buying a special helmet for an injured player. The device is thoroughly padded with soft rubber molded on. McMillan Athletic Goods Co., Inc., 726 Wabash Ave., Terre Haute, Ind.



Purvis of Purdue Wearing Rubber Covered Nose Mask

Rubber Industry in America

OHIO

AUTOMOBILE production now in full swing has caused corresponding activity in tire and tube plants and those in the mechanical goods lines that specialize in automotive rubber specialties. The production of belting, packing, and hose, particularly garden hose, is seasonally brisk. Sundries are in fair production, but are tending to be keenly competitive. The same may be said of heels, owing to their production by the big leather shoe companies.

The Master Tire & Rubber Corp., Cuyahoga Falls, O., held a sales meeting on February 4, attended by northern Ohio representatives of the three tire operating divisions: namely, Falls, Cooper, and Grant. The meeting was addressed by President R. P. Bremer, Vice President and Sales Director F. C. Millhoff, Assistant Treasurer in Charge of Credits C. R. Wetsel, and Factory Manager W. B. Brewer. One of the principal topics of discussion was the "Budget Plan" of selling, led by Mr. Wetsel.

President Bremer in his concluding talk said "We have turned the corner of the depression and are definitely on the up-grade. We look forward to the future with confidence."

The company announces a new "High Carbon Tread Rubber" tire.

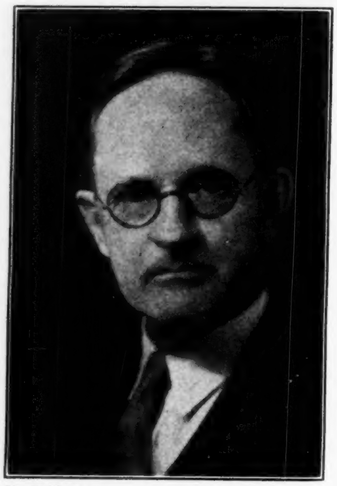
The Seiberling Rubber Co., Akron, has been elected a member of the Association of National Advertisers, in which J. P. Seiberling, vice president in charge of sales, will represent his company.

The General Tire & Rubber Co., Akron, has named J. U. Randle special sales representative in the Cleveland and northern Ohio territory.

The DeVilbiss Co., Toledo, through its directorate recently elected W. F. Gradolph, with the company twenty-four years, vice president in charge of sales.

Summit Mold & Machine Co., Akron, has appointed as exclusive sales agent Stanley W. Harris, formerly president of the National Rubber Machinery Co. A. S. Michelson, also formerly with National, has joined Mr. Harris.

Henderson Tire & Rubber Co., Bucyrus, at the first annual stockholders' meeting reelected the directorate as follows: F. L. Hopley, John Shunk, William C. Beer, W. J. Schwenck, and C. O. Henderson, manager of the plant. The company, which employs about a hundred men, has shipped several orders to foreign ports. Prospects for future business are good.



Pach Bros.

Ernest Blaker

Physical Research Expert

Ernest Blaker, now a member of the physics research department of The B. F. Goodrich Co., was born in Newtown, Pa. Majoring in civil engineering, he was graduated from the University of Kansas in 1893 with the degree of Bachelor of Science. As a graduate student in physics at Cornell University, he received his Ph.D. in 1901.

From 1899 to 1917 Dr. Blaker was a member of the staff of the department of physics at Cornell, being in charge of undergraduate laboratories from 1901 to 1915 and of intermediate, i.e., preparatory for research, courses from 1912 to 1917. He was in charge of the Airplane Division, U.S.S.M. aeronautics at the university during 1917 and 1918.

With the beginning of the next year Dr. Blaker joined the Goodrich organization as manager of the temperature control department. During the establishment (1928-1929) of the Pacific Goodrich plant of Los Angeles, Calif., he was in charge of its technical department. Returning to Akron, he acted as manager of the inter-factory operation department for a year. In 1930 he was transferred to the tire department and later to the physics research laboratory. That the force of his personality is appreciated by his co-workers, even as his ability has been recognized by his employers, may be seen in the fact that he was recently elected president of the company's Office Employes Cooperative Plan.

Dr. Blaker has published several articles relative to the findings of his work and also holds patents, assigned to Goodrich, on various mechanical devices. While at Cornell he published a laboratory manual of physics and also collaborated with Prof. E. L. Nichols in the writing of another manual.

Dr. Blaker is a fellow of the American Physical Society and a member of the American Chemical Society, Beta Theta Pi, Gamma Alpha, and Sigma Xi fraternities, and various Masonic orders.

He resides at 616 Weber Ave., Akron, O.

Goodrich Notes

Exchanging reminiscences of much earlier days in the rubber industry, Evan J. Evans, experimental compounder in the Philadelphia Rubber Works division of The B. F. Goodrich Co., Akron, and J. D. Tew, company president, both celebrated anniversaries in January. Mr. Evans joined Goodrich on January 10, 1891, and President Tew, January 10, 1906. During their chat they talked of the days when President Tew was a member of the six-man crew on the calender commanded by Mr. Evans in 1906.

"When I was in charge of a calender twenty-nine years ago, I found in my crew one morning a young fellow named Tew recently out of college who wanted knowledge and experience in the rubber industry," Mr. Evans said. "Well I believe I gave him all he wanted. He could take it, even though now and then in those days I needed to touch him up a little, just as I did the other boys."

P. E. Slack, Goodrich district manager in the San Antonio, Tex., district, won first prize in a recent sales contest between all district managers in the company's national tire sales organization. Melvin Broady, truck tire salesman in the same district, was accorded similar honors in the contest among members of the truck tire sales group; while E. G. Parkening, general line salesman in the Kansas City, Mo., district, was first in that class.

E. C. Bard, division operating manager of the company's Chicago district, was appointed to the same post at the Detroit district. He joined Goodrich in 1902 in the credit department at Akron and has held various executive posts throughout the country.

K. H. McIntire was named operating manager of the Pittsburgh district. He joined the company in 1920 in the promotion department of the Columbus, O., branch, where he spent six years in various sales and advertising

posts. He has also been credit and operating manager in the Toledo, O., unit of Goodrich Silvertown Stores and was in the personnel division of the sales control department at Akron.

Francis L. Mulcahy, credit manager at Boston, was made district credit manager of the Milwaukee district. He came to Goodrich in 1926, at Boston, where he served in various credit capacities.

Ohio Rubber Co., Akron, according to Factory Manager R. A. Mertz recently raised the wages of over 500 employes 5¢ an hour. This increase followed one given to 300 workers in the running board department. O. B. Waite, who resigned as purchasing agent of the company, has been succeeded by J. R. Keach, formerly with the Firestone Tire & Rubber Co. Factory operations were curtailed as the result of a strike called February 18 after a series of meetings between company officials and the union. Mr. Mertz said the firm wanted to arbitrate, but the union refused.

International Lead Refining Co. plants, a wholly owned subsidiary of Anaconda Copper Mining Co., are now operated by International Smelting & Refining Co., another wholly owned Anaconda Copper subsidiary, which will assume and perform the outstanding sales agreements of International Lead Refining Co. F. O. Case, manager of the Zinc Oxide Department at East Chicago, Ind., and Akron, O., will continue in the same position for the successor company.

Lincoln Rubber Co., Barberton, announces that a new and larger building will be constructed at once to replace the plant destroyed by fire on February 20. Wm. F. Kelley, president and general manager, stated that the new factory would be in operation about May 1.

Goodyear Activities

Vice President C. C. Slusser, of the Goodyear Tire & Rubber Co., Akron, has announced the appointment of A. C. Michaels, general foreman of mechanical goods, to the post of general superintendent of the factory at Gadsden, Ala., succeeding Frank Steele, who has been transferred to the Goodyear plant in England. Mr. Michaels, who graduated from Ohio State as a chemical engineer, joined Goodyear in July, 1923. He has been connected with the efficiency, inter-plant relations, and development departments. In January, 1929, he was made night superintendent at Plant 2 and the next year became department foreman of the mill and calender rooms there. In February, 1934, he was appointed general foreman, mechanical goods division.

F. W. McConky, division manager, has announced the appointment of A. P. Bethel as the St. Louis, Mo., branch manager. He had been branch manager at Omaha, Neb., for eleven years.

Goodyear has announced a new rubber lining for metal tanks to protect them in use against the action of acids and corrosive liquids. Known as Plioweld, it is a rubber derivative applied to clean metal and is actually welded to it during the process of vulcanization. The adhesive used in the application of the rubber lining to the tank is another new development feature in that the adhesive is dissolved in a non-toxic solvent; consequently hazards to workmen making the application are avoided.

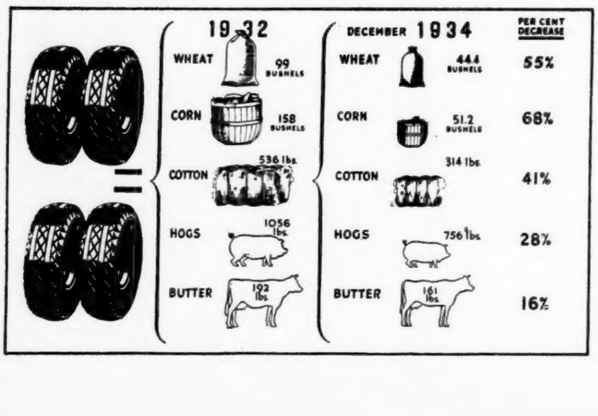
W. J. Lee, of the Goodyear development department, recently conducted a practical demonstration of the safety features of the new Goodyear Lifeguard inner tube at Floyd Bennett Airport, Brooklyn, N. Y. Representatives of the New York Police Department, safety organizations, insurance companies, and the press witnessed the comparative effect on the control of cars, running at high speed, when their tires, some containing regular tubes and others safety tubes, were suddenly and artificially blown-out or spike punctured. With regular tubes the tires flattened immediately, causing the car to swerve violently before it could be stopped; while with the Lifeguard tube the car continued in a straight course under perfect control because the tire flattened slowly as with a slow leak.

R. E. Davis, manager, Goodyear Commercial Research Department, has determined the cost of a set of four average passenger car tires in terms of five important farm commodities, and the results are shown graphically in the accompanying illustration, which reveals that in 1932 it took 99 bushels of

A. C. Michaels

wheat to purchase four average passenger car tires; while in December, 1934, but 44.4 bushels were necessary, a decrease of 55%. In 1932, 158 bushels of corn were needed; while in December, 1934, only 51.2 bushels were required, a decrease of 68%. Cotton to the amount of 536 pounds was needed in 1932, as against 314 pounds in December, 1934, a decrease of 41%; and 1,056 pounds of hogs were required in 1932 as against 756 pounds in 1934, a decrease of 28%. The amount of butter necessary decreased 16%, 192 pounds being the 1932 figure as against 161 pounds for 1934. These commodity prices are those actually received by the farmer and are not market prices. These five commodities represent 50% of the national farm cash income. Despite the fact that tire list prices have increased 11.6%, the wheat farmer can buy a set of tires today with 55% less bushels of wheat than he could in the fall of 1932. This, of course, is due to the substantial increase in the price of wheat.

Construction of a new Goodyear tire factory in Java is already a month ahead of schedule. The formal opening has been set for May. H. I. Belknap, general superintendent, E. T. Ruffner, assistant superintendent, and C. R. Washburn, chemist, sailed from Los Angeles on January 26 to take up their new duties. R. W. Hadley, long in export sales in the Far East, will be managing director, and Donald Gow, secretary-treasurer. J. G. Polm is already in Java in charge of purchasing, personnel, and staff work. Twelve members of the Flying Squadron, a group of men who put in a three-year course covering every operation in tire manufacturing, will leave in April to train the Javanese labor in manufacturing processes. Two members of the Squadron from Goodyear's Australian plant will join the Akron men there. Goodyear already has a substantial investment in Netherland India in its rubber plantations in Sumatra, totaling almost 100,000 acres.



Cost of Set of Tires in Terms of Leading Farm Products

NEW JERSEY

PRACTICALLY all New Jersey rubber manufacturers report that business this winter showed a substantial increase over the same period last year. Officials are also optimistic over the future trade. Inclement weather was a boon to plants producing rubber footwear, and orders emptied warehouses. Orders from the automotive industry in Michigan also boosted business in New Jersey.

If the rubber code merchandising plan should go through, which makes "plain sailing" from distributer to consumer, business should be even better. It would take very little to start good buying as the country has been through such a long period of indefiniteness. No large stocks of mechanical goods appear around the nation as all factories are united in limiting and finally abolishing this feature of consigned stocks—always an eventual loss. Thus local rubber manufacturers anticipate increased trade this spring regardless of the state tax outlook which is held a severe blow to anything but a very normal profit.

Manufacturers of stationers' rubber goods, however, do not find the outlook rosy. The eraser industry particularly is being greatly harmed by Japanese competition, and it is hoped the Tariff Commission will take prompt action in granting sufficient protection to domestic manufacturers to enable them to remain in business.

Jos. Stokes Rubber Co., Trenton, reports that trade picked up the past month both at the Trenton and the Canadian plants at Welland, Ont., which Secretary-Treasurer Milton H. Martindell recently visited.

Lambertville Rubber Co., Lambertville, has been busy the past few weeks filling footwear orders. The plant, which had been running with a decreased force, was compelled to increase its staff.

Acme Rubber Mfg. Co., Trenton, declares business shows a substantial increase over that of last winter, and spring prospects are very good.

Luzerne Rubber Co., Trenton, announces that hard rubber output is increasing.

The Pocono Co., Trenton, while experiencing unchanged business the past few weeks, anticipates increased orders the beginning of spring. On February 12 a serious fire, causing heavy losses, swept the Pocono plant.

Mercer Rubber Co., Hamilton Square, found business in January, 1935, considerably better than in January, 1934.

Essex Rubber Co., Trenton, believes the coming summer will show considerable improvement in the rubber business. Essex output has been much higher than a year ago. Lawrence M. Oakley, an official of the company, was on a business trip through New England.

Thermoid Notes

The Thermoid Co., Trenton, according to Chairman Fred E. Schulter, has purchased the plant of the former Mercer Motors Co. opposite the main Thermoid plant. The property acquired consists of ten acres and over 170,000 square feet of floor space and a modern office building. Thermoid announced the additional property provides space for expanding business in line with increased production and sales. Mr. Schulter also stated that Thermoid will move the business of the Woven Steel Hose & Rubber Co. into the Mercer plant to permit a saving in overhead and other handling charges. Woven Steel Hose, owned by Thermoid, now is three miles from the main plant.

Thermoid, which also controls Thermoid Textile Co. and Thermoid Rubber Co., also in Trenton, and Southern Asbestos Co., Charlotte, N. C., has organized Thermoid, Ltd., under a Dominion charter as the company's Canadian subsidiary, with offices at 47 Simcoe St., Toronto, Ont. Arthur B. Dougall, with the parent company for many years as assistant sales manager and in charge of Canadian sales, was elected president of the Canadian subsidiary, and Allen G. Sylvester, of Toronto, who is well known throughout the Canadian automotive and accessories trade, is vice president and sales manager. The company will maintain a complete warehouse stock in Toronto of the entire line of automotive products that are manufactured by The Thermoid Co.

Production of a new brake block for bus and truck brakes was likewise announced by Thermoid, following laboratory and high-pressure friction tests under the direction of Vice President Carl Schell, who invented and developed the product.

Uniflex Rubber Co., 40-42 Paterson Ave., East Rutherford, manufactures molded rubber goods and plumbers supplies.

Pierce-Roberts Rubber Co., Trenton, now operates two shifts in the press room.

Whitehead Bros. Rubber Co., Trenton, is busy both in its mechanical goods and rubber shoe departments.

Puritan Rubber Co., Trenton, finds business conditions much improved over those of last year.

Foreign Trade Information

For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Room 734, Custom House, New York, N. Y.

No.	Commodity	City and Country
*8,251	Automobile tires	Windsor, Canada
†8,279	Rubber tapping knives, etc.	Medan, Sumatra
‡8,281	Rubber soled shoes ...	Santa Cruz de Tenerife, Canary Islands
†8,309	Balata belting	Piraeus, Greece
†8,322	Bathing caps, rubber clothing, garden hose, bands, boots, balloons, and household and druggists' sundries ...	Johannesburg, South Africa
*8,382	Tire grooving machinery	Amsterdam, Netherlands
†8,392	Rubber cloth	Brussels, Belgium
†8,400	Raincoats, etc.	Batavia, Java
†8,431	Balloon tires	Rangoon, India
†8,432	Tires and inner tubes..	Rio de Janeiro, Brazil

*Purchase. †Agency. ‡Purchase and agency.

OBITUARY

Veteran Employe

JOSEPH W. HOLMES, a foreman in the cotton hose department of the Acme Rubber Mfg. Co., Trenton, N. J., where he had worked thirty-five years, died February 2.

He belonged to the Jr. O.U.A.M. and Loyal Order of Moose.

He leaves his wife, two daughters, and two sons.

Interment was in Greenwood Cemetery, Trenton.

Retired Foreman

JOHN B. DOBBINS, SR., 64, died late in January following a lengthy illness. He joined the Hamilton Rubber Mfg. Co., Trenton, N. J., when he was 22 and was later advanced to a foreman. He retired three years ago.

He was a member of the Jr. O.U.A.M.

He is survived by his wife, a daughter, and two sons.

Burial was in Riverview Cemetery, Trenton.

Inventor-Manufacturer

PNEUMONIA caused the death in Miami, Fla., on February 6 of James Hardman, who about 1878 founded the Hardman Rubber Co., Belleville, N. J., manufacturer of rubber goods, from which he retired in 1917. He was interested in perfecting molds for rubber manufacturers and invented several machines and processes for making rubber products. In 1895 Mr. Hardman also organized the Belleville Building & Supply Co. and was instrumental in having Belleville become one of the first municipalities in the United States to use electricity for street lighting.

Mr. Hardman, who was born in Manchester, England, eighty-seven years ago, was brought to Massachusetts when a boy. His first position was as a machinist with the Mason Locomotive Works.

He was a charter member of the Masonic and Elk lodges in Belleville, a former treasurer of the township of Belleville, and a former member of the township committee.

Surviving are his wife, a daughter, and three sons.

EASTERN AND SOUTHERN

RUBBER goods manufacturers report business much better than a year ago, with the outlook for spring business very promising. The tire replacement field seems favorable for normal business in the spring, but retail prices should advance to meet raw material costs if manufacturers expect to earn a profit. It is believed that the automobile industry, working now at capacity, will gradually slow down, but this resulting loss of business to the rubber industry should be offset by orders due to the expected gain in building operations. Increased demand for rubber products absorbed by packing industries also should become noticeable.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has started research in industrial hygienic hazards in its new Haskell Laboratory of Industrial Toxicology at Wilmington.

Lee Tire & Rubber Co., Conshohocken, Pa., according to Advertising Manager George H. Duck has completed its fourteenth consecutive month on full time.

United Carbon Co., Charleston, W. Va., purchased for $1,000,000 the carbon black and natural gas properties of the Century Carbon Co. in the Monroe and Richland fields in Louisiana. The company has also acquired the Texas Carbon Industries, Inc.

Zenite

Zenite, zinc salt of mercapto-benzothiazole, is a new all-purpose accelerator. Zenite A and Zenite B are two modifications containing an activator and a scorching inhibitor. These modifications are faster curing than Zenite, but have no greater tendency to cause scorching. Both produce higher modulus stocks.

Zenite A is for use in pure gum stocks and those loaded with non-reenforcing fillers. Zenite B is for use in stocks heavily loaded with clay and carbon black.

Beta-Trichlorethane

Beta-Trichlorethane is a solvent for synthetic as well as natural rubbers. It is a non-flammable, water-white chlorinated hydrocarbon. Besides its unique solvent power for rubber it is a rapid and powerful solvent for oils, fats, waxes, tars, and natural resins. It is miscible with alcohol, ether, and many other organic solvents, but is practically immiscible with water.

Other properties of Beta-Trichlorethane include boiling point of 114° C. (237° F.), specific gravity of 1.4406 (12 pounds per gallon), and high stability in the presence of light and water. Because of this last property it is noncorrosive to most materials of construction, an important feature in industrial applications.

Rubber Code News

Automobile Industry Code

Presidential approval of an amendment to the code of fair competition for the automobile manufacturing industry was granted in an executive order, January 31, 1935.

The amendment provides for:

An extension of the code until June 16, 1935, or until the emergency has ended;

Payment of time and a half overtime rates for all work done by employes over forty-eight hours a week;

Authorization of members of the industry to agree among themselves to announce new automobile models in the fall of the year, as a means of facilitating regularization of employment;

Confirmation and continuation of the automobile labor board, as a means for the settlement of labor controversies.

Official NRA Orders

Code No. 156: Order 58, granting exemption to the Holfast Rubber Co., Atlanta, Ga., from the provisions of Chapter I, Article V-B, Section 1, of the code, for a period of ninety days from the date of this order, to the extent that it is allowed a differential of 5¢ per hour below the minimum wage rates set forth therein, except as same applies to apprentices. The order further provides that a copy be posted in a place readily accessible to all employes affected thereby.

Termination of the exemption granted July 31, 1934, to the members of the Rubber Trade Association of New York, Inc., from provisions of the code of fair competition for the importing trade was ordered February 7 by the NRA. The exemption had been granted under the terms of an executive order which provided that firms not participating in the writing of a code to which they object may be granted a stay pending a hearing on their petitions. On November 20 the NRA conducted a hearing on a supplementary code presented by the Rubber Trade Association on behalf of its membership, which includes 100% of the crude rubber importers of America. That supplementary code now is being considered by the Board.

Members of the Heel and Sole Division of the rubber manufacturing industry have been exempted from the code's price filing provisions under an order announced February 5 by the NRA, which stays Sections 4 and 5 of Article III-A of the heel and sole chapter of the code. The order approves the divisional code authority's request for a stay and will remain in effect for an indefinite period or "until such time as the members of the . . . division adjust themselves to a more effective application of the price filing provisions . . ." The provisions which have been stayed required members to file with the Divisional Code Authority complete schedules of prices and terms to which they were required to adhere.

Code Authority Members

Rainwear Division: F. F. Sommers, Jr., Chicago Rubber Clothing Co., Racine, Wis.; A. B. Zuckert, A. B. Zuckert Co., Milwaukee, Wis.; William H. Lichtenstein, Peerless Garment Co., Boston, Mass.; Fred Monosson, Cosmopolitan Mfg. Co., Cambridge, Mass.; Moe Sherman, Sherman Bros. Rainwear Corp., New York, N. Y.; S. D. Harris, Harris Raincoat Co., New York; and the following representative for the vulcanizing division: James J. Drummey, United States Rubber Products, Inc., Mishawaka, Ind.

Reclaimed Rubber: V. H. Dingmon, The Xylos Rubber Co., Akron, O.; L. J. Plumb, United States Rubber Reclaiming Co., New York, N. Y.; William Welch, Midwest Rubber Reclaiming Co., E. St. Louis, Ill.

New York Meeting A. C. S.

The New York meeting of the American Chemical Society to be held April 22 to 27, 1935, in New York will probably be the largest ever held by the society. It will be the occasion for celebrating the three-hundredth anniversary of the American chemical industry.

The banquet on Wednesday evening will be a brilliant affair. Speakers of national prominence, together with an exceptionally fine entertainment, will make this an occasion that every chemist who is able should not fail to attend.

The Pennsylvania Hotel, 32nd St. and Seventh Ave., has been selected as convention headquarters. The Governor Clinton Hotel, Hotel New Yorker, and the McAlpin Hotel are designated as official hotels by the New York Section. Almost all meetings will be held in the Pennsylvania Hotel. The address of the secretary of the Division of Rubber Chemistry is C. W. Christensen, The Rubber Service Laboratories Co., 1012 Second National Bldg., Akron, O.

The Rubber Division will hold four sessions on Monday and Tuesday at the Hotel New Yorker and will hold a subscription dinner of its own on Monday evening, April 22.

The New York Group will not hold the customary spring meeting, but instead will take part in the Rubber Division meetings, April 22 and 23, at the Hotel New Yorker.

The New York Group plans to hold an outing not later than June 15.

R. L. Chipman, the well-known crude rubber man, is associated with Frank B. Ross & Co., Inc., 79 Wall St., New York, N. Y. He is prepared to sell rubber to factories and dealers.

© Bachrach

Allan F. Kitchel

Binney & Smith Co., 41 E. 42nd St., New York, N. Y., recently named Allan F. Kitchel president of the company to succeed his father-in-law, the late Edwin Binney. Mr. Kitchel had previously been vice president and director of sales. Other executives include S. Vere Smith, chairman of the board of directors, a new office with the company; Norman Lee Smith and John Stead, vice presidents; and F. R. Cantzlaar, secretary-treasurer. Mr. Kitchel joined Binney & Smith after his graduation from Yale University in 1909. After serving a thorough apprenticeship in the concern's manufacturing departments in West Virginia he came to the New York office. Mr. Kitchel, who was born in Liverpool, O., December 28, 1885, is generally acknowledged as having played a large part in promoting the vast use of carbon black in tire manufacture.

United States Rubber Co., 1790 Broadway, New York, N. Y., recently leased a three-story building in New Orleans, La. The company was represented by E. J. Espenan, New Orleans manager, and F. W. Strong, of the New York office. E. J. Coughlin, vice president, director, and a member of the executive committee of U. S. Rubber, on January 30 completed 45 years with the company. This career began when, as a boy, he entered the shipping department of the New York Belting & Packing plant, Passaic, N. J. Within thirteen years he was manager of the plant and twelve years later was in charge of all factories of the mechanical goods division. His next promotion was to second vice president in 1920, with supervision over all plants except tires. He was advanced to his present post in April, 1929.

United States Bureau of Foreign and Domestic Commerce, Washington, D. C., through Director C. T. Murchison has announced the appointment of Eugene W. Sloan as chief of the Leather and Rubber Division. Mr. Sloan, who is from St. Louis, Mo., has had a varied experience in the shoe and leather business, being familiar with both domestic and export sales phases.

Everett G. Holt, assistant chief of the division, on February 4 addressed members of the Foreign Trade department at Washington on the rubber industry.

Godfrey L. Cabot, Inc., 77 Franklin St., Boston, Mass., operating companies held their annual safety banquet February 2 at Crazy Hotel, Mineral Wells, Tex. For the second time the safety contest was won by the Eliasville plant. Kingsmill was second for 1934. Attending the dinner were employes of the winning plant; a representative from each of the other Cabot plants; R. G. Allen, general manager; C. L. Wooley, general superintendent; Don M. Conley, safety supervisor of the Cabot companies in Pampa, Tex.; and from the parent organization, Thomas D. Cabot, secretary-treasurer, and Edmund Billings, vice president.

A.S.T.M. Regional Meeting

The 1935 Regional Meeting of the American Society for Testing Materials is to be held in Philadelphia, Pa., at The Warwick Hotel, March 6, 1935, and a large number of Society committees are scheduling meetings over the five-day period, March 4 to 8, when the Spring Group Meeting will be in progress. Committee D-11 on Rubber Products is among those that have planned a group meeting.

The personnel of the Akron Division of the Cleveland District Committee, A.S.T.M., follows: J. J. Allen, chief chemist, mechanical rubber goods division, The Firestone Tire & Rubber Co.; Arthur W. Carpenter, manager of testing laboratories, The B. F. Goodrich Co.; and E. G. Kimmich, The Goodyear Tire & Rubber Co.

The Micronex Group

The carbon blacks of the Micronex group are characterized by different practical compounding effects. Thus, Standard Micronex is preferred by users who employ an accelerator of alkaline type, or nominal amounts of acid accelerators, particularly when it is desired to restrict the proportions of free fatty acid.

Micronex W-6 is fast curing and easy calendering. Being somewhat larger in particle size and therefore less reenforcing, it is suitable for high loadings and where economy in process is a major consideration.

Micronex W-5, designed and controlled for the wire trade, assures necessary reenforcement where dispersion is of primary importance for the preservation of insulating properties.

Micronex Mark II is a finer and more reenforcing specialty requiring greater attention to processing details. It requires an acid type of accelerator and Stearex in adequate proportions.

Micronex Beads, the original pellet black, is unaltered as to its original inherent properties with ready dispersibility plus the feature of clean handling.

MIDWEST

MAKERS of rubber goods in the Midwest find conditions better than they have been for several years, and future prospects are encouraging. The heavy snow depleted dealers' stocks of rubber footwear, but dealers are reordering only just what they think they need for the remainder of the season; consequently the at-once business for January and February has been disappointing. This small reordering, however, augurs well for the fall trade, and salesmen now starting out for this business expect good results.

Union Carbide & Carbon Corp., 30 E. 42nd St., New York, N. Y., will complete its new $7,000,000 synthetic chemical plant at Whiting, Ind., about April 1.

National Association of Waste Material Dealers, Inc., Times Bldg., New York, N. Y., will hold its twenty-second annual convention at the Sherman Hotel, Chicago, Ill., March 18, 19, and 20. Louis Lippa heads the committee in charge which plans many interesting features including the annual banquet March 20. Besides the annual meeting of the association, together with the various meetings of the directorate, will be meetings of various divisions and subsidiary associations, including the Scrap Rubber Institute, also meetings of most of the code authorities, the code finance committee, and the waste trade committee.

The first of a series of bulletins U. S. Rubber is erecting along the highways of Florida to flash its historical highlights and the quality of U. S. Royal Tires. This board stands just out of Miami on the Tamiami Trail.

NEW ENGLAND

MOST rubber manufacturers in New England, in reporting present sales somewhat higher than a year ago, believe they will continue better for 1935. Here, again, the automobile industry is keeping busy those firms that supply its needs. The druggists' sundries division of the rubber manufacturing industry, however, is in a very chaotic condition, with the outlook anything but pleasant. Tire makers also are not too optimistic. Strenuous efforts are being made to maintain the new prices on tires and tubes that went into effect last November, but this task has been found extremely difficult because of the competition which all makes of factory trade brand tires are meeting from special-brand tires and tubes made mostly by the large companies and sold through mass distributers or smaller manufacturers who are able to keep going, notwithstanding their financial standing, because of aid given by the federal government financed agencies.

The New "Flying Yankee"

A self-propelled, articulated unit, high-speed train of lightweight stainless steel construction has been completed for the Boston & Maine Railroad and Maine Central Railroad by the Edward C. Budd Mfg. Co., Philadelphia, Pa. This train is known as the "Flying Yankee."

Of particular interest in the construction of the trucks is the extensive use of rubber insulation to prevent the transmission of sound and other high-frequency vibrations to the car bodies.

As indicated in the illustration, there are inserts under the center plate, in both top and bottom equalizer spring seats, and between the ends of the equalizers and journal boxes. The bolster chafing plates are of hardened spring steel, but are insulated from the frame by vulcanized pads of sound-deadening rubber. At the sides of the center plate are strips of rubberized fabric belt material which take fore and aft thrusts and prevent metallic contact and transmission of sound. In addition to the pad under the center plate, rubber thimbles are provided around the king pin and the center plate bolts, the latter also including washers. A further precaution against unnecessary noise is the provision of automotive brake lining wherever the members of the truck brake rigging are likely to rub. To dampen low frequency vertical oscillations helical-volute springs are used on the equalizers of all four trucks. To dampen horizontal oscillations at high speeds Houde double-acting hydraulic railroad shock absorbers are installed between the bolster and truck transoms on the three trailer trucks.

After an exhibition tour the "Flying Yankee" will be installed in service between Boston, Portland, and Bangor, Me.

United States Rubber Products, Inc., Naugatuck, Conn., according to Factory Manager Walter H. Norton has recalled two hundred employes to the various Keds departments because of increased production.

Wm. F. Alden Co., Inc., manufacturer of cut rubber thread, is moving from Needham to Clinton, Mass., to take care of its enlarged production. Wm. F. Alden is president and treasurer of the company, and F. J. Kennedy, superintendent.

Globe Rubber Works, Inc., manufacturer of mechanicals and molded goods, 45 High St., Boston, Mass., through Treasurer A. I. Knowles has announced the election by the board of directors of C. J. Leonard as sales manager. Mr. Leonard, who has been with the company five years and is very familiar with the New England territory, will have charge of the company's ten salesmen besides covering his own assigned territory. The company, of which Winfield S. Knowles is president, expects a larger volume of sales for 1935 than ever before experienced.

Charles L. Sheldon

Hood Purchasing Agent

Charles L. Sheldon, purchasing agent of the Hood Rubber Co., Inc., Watertown, Mass., was born in West Rutland, Vt., April 20, 1892. He was graduated from the local high school in 1908 and from Rutland Business College in 1909.

Then he started working for the Hood Rubber Co. in the raw materials department, acting as storekeeper until made purchasing agent in 1915. Mr. Sheldon also is a member of the National Association of Purchasing Agents and a director of the New England Purchasing Agents Association.

Vultex Chemical Co., 666 Main St., Cambridge, Mass., has added to its staff George D. Kratz, well-known rubber chemist, who will represent the company in the metropolitan district in a sales and technical capacity. He will be in charge of the office at 125 Duane St., New York, N. Y.

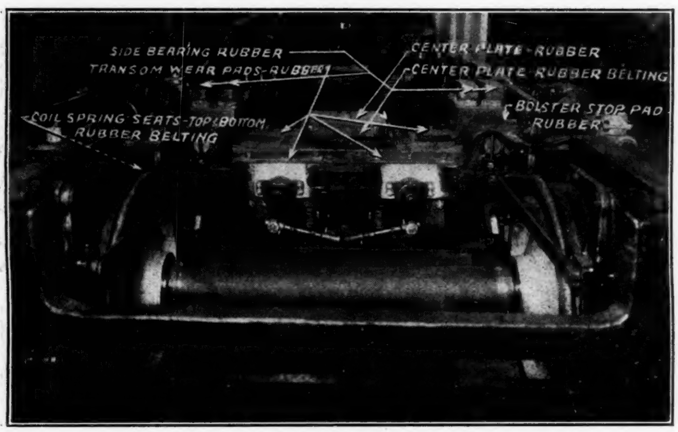
H. I. Gould has resigned as president of the Gould Golf Ball Co., Wakefield, Mass., and has sold his interests in the concern. He has not yet revealed his future plans.

The American Wringer Co., Woonsocket, R. I., has filed statement at the office of Secretary of State that its capital stock has been changed to $1,-350,000.

The Firestone Tire & Rubber Co., Akron, O., has leased for one year, with privilege of a ten years' renewal, land and buildings on Aborn, Fountain, and Sabin Sts., Providence, R. I.

United States Rubber Co. petition for the dissolution as a corporation of the National India Rubber Co., Bristol, R. I., without the appointment of a receiver has been granted by the Superior Court.

(*Continued on page 62*)



One of the "Flying Yankee's" Trucks Showing Rubber Applications.

FINANCIAL

B. F. Goodrich Co.

The accounts of The B. F. Goodrich Co., Akron, O., for the fiscal year ended December 31, 1934, showed consolidated sales of $103,871,717 compared with $79,293,495 in 1933, an increase of $24,578,222, or 31%. Net profit for the year after provision for depreciation, interest, and federal income taxes, and deduction of profit applicable to subsidiary companies' capital stock not owned by The B. F. Goodrich Co. amounted to $2,534,679, compared with $2,272,514 in 1933. In 1934 special items consisting of profit on securities sold and gain in acquiring the companies' bonds and debentures below face value less other items not relating to normal operations of the year amounted to $872,666, as against similar extraordinary gains of $2,425,678 during 1933. The improvement in the results from ordinary operations of the business therefore amounted to $1,815,177. No unrealized profit on foreign exchange was taken into profits during 1934. Raw materials on hand and material content of unfinished and finished goods were valued at the lower of cost or market on December 31, 1934. Materials on commitment at the end of the year were contracted for at prices below the market on that date. Total current assets amounted to $57,666,556, and current liabilities to $9,414,282, giving a ratio of 6.12 to 1. Cash, foreign short term deposits, and government securities totaled $6,570,310.

Goodyear Tire & Rubber

Net profit of the Goodyear Tire & Rubber Co., Akron, O., and subsidiaries for 1934 was $4,553,964 after depreciation, taxes, interest, subsidiary dividends, and other charges and including profit of $266,279 on book values of foreign net current assets previously written down by charges to profit and loss. This net profit equaled $6.04 a share on 753,760 no par shares of $7 first preferred stock. In 1933 the net profit was $6,021,535, which included a profit of $1,887,529 on book values of foreign net current assets previously written down by charges to profit and loss. It equaled, after $7 first preferred dividend requirements, 47¢ a share on 1,943,769 no par shares of common stock.

Excluding the profit on book values of foreign net current assets in each year, the balance for 1934 was equal to $5.69 a share on the $7 first preferred stock, and compared with $5.44 a share on 759,720 shares in 1933.

Net sales last year were $136,800,764, against $109,655,636 in 1933.

Monsanto Chemical Co.

Monsanto Chemical Co., St. Louis, Mo., including proportion of undivided profits of controlled companies not consolidated and uncontrolled companies, for 1934 announced a net profit after depreciation, interest, federal taxes, and other charges of $2,771,629, equal to $3.20 a share on 864,000 $10 par shares of capital stock outstanding, after giving effect to 100% stock distribution last April. This compares with $2,221,207, which, computed on above share basis, is equal to $2.57 a share in 1933. Of the 1934 net earnings, $2,638,040, or $3.05 a share resulted from operations of parent company and wholly owned subsidiaries.

New Jersey Zinc Co.

Net income of the New Jersey Zinc Co., 160 Front St., New York, for 1934 was $3,788,380 after taxes, depreciation, depletion, contingencies, and other charges, equal to $1.93 a share on 1,963,264 of $25 par capital shares. This compares with $3,994,072, or $2.03 a share, in 1933.

For the final quarter of 1934 the company earned $955,231 after similar deductions, equal to 49¢ a share. In the preceding quarter the net income of $746,637 equaled 38c a share, and in the fourth quarter of 1933 it was $1,108,783, or 56¢ a share.

Raybestos-Manhattan

Raybestos-Manhattan, Inc., Bridgeport, Conn., earned net income of $750,891.59 in 1934, equivalent to $1.17 per share, comparing with net income of $685,198.61, or $1.07 per share, during the year prior.

The total assets amounted to $16,204,367.07 and included $7,722,694.32 of current assets, equivalent to ten times the current liabilities of $771,409.31 at the close of the year. The company had no banking or funded debt or other capital obligations. The book value of its 641,300 shares of stock outstanding, after deducting the 34,712 shares held in the treasury, was $22.93 per share. The net current assets represented $10.84 per share, of which cash and marketable securities amounted to $4.16 per share.

United Carbon Co.

United Carbon Co., Charleston, W. Va., and subsidiaries for 1934 reported a net income of $1,452,939, equal, after allowing for preferred dividends paid to date of retirement, to $3.55 a share on 394,327 common shares, compared with net income, before federal taxes, of $636,217, equal, after preferred dividend requirements, to $1.39 a share on 370,127 common shares in 1933. Figures for 1934 include operations of the Texas Carbon Industries, Inc., from date of acquisition early in December. Current assets on December 31, 1934, totaled $2,996,711, and current liabilities were $828,679, compared with $3,442,553 and $536,594, respectively, at close of 1933; cash increased to $1,189,605 from $667,759.

PACIFIC COAST

Rubber manufacturers in California report business is steadily increasing and future prospects are very bright.

E. M. Smith Co., 637 S. Clarence Ave., Los Angeles, Calif., manufacturer of mechanical rubber goods, recently completed a factory addition 80 by 120 feet. New installations include a Banbury mixer.

Goodrich Executive

The Bar's loss was Rubber's gain in the case of Joseph C. Herbert, general manager of the Pacific Goodrich plant of The B. F. Goodrich Co. in Los Angeles, Calif. He started his business career as a practising attorney in Cleveland, O., in 1921 and in 1927 was employed by Goodrich in Akron as assistant counsel. He served as secretary of the Pacific plant from 1928 to 1931 and was appointed to his present post last year. Mr. Herbert is also assistant secretary of the parent organization in Ohio.

He was born in Cleveland, October 20, 1897. He attended Western Reserve University, graduating from the Arts College in 1919, an A.B., and from the Law College in 1921, an LL.B. He belongs to Delta Tau Delta and Phi Delta Phi.

Mr. Herbert lives at 1115 Roanoke Dr., San Marino, Calif.

CANADA HAS APPLIED DUMPING DUTIES against foreign rubber footwear, including rubber soled shoes. This dumping order, designed to protect the Canadian industry, does not apply to British preferential tariff.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Faultless Rubber Co.	Com.	$0.50 q.	Apr. 1	Mar. 15
Gates Rubber Co.	7% Pfd.	$1.75 q.	Mar. 1	Feb. 16
Goodyear Tire & Rubber Co.	$7 Pfd.	$1.00 q.	Apr. 1	Mar. 1
O'Sullivan Rubber Co.	Com.	$0.10 q.	Dec. 31	Dec. 10
Plymouth Rubber Co., Inc.	7% Pfd.	$1.75 q.	Jan. 15	Jan. 2
Raybestos-Manhattan, Inc.	Com.	$0.25	Mar. 15	Feb. 28
Tyer Rubber Co.	Com.	$0.25	Feb. 8	Feb. 2
Tyer Rubber Co.	6% Pfd.	$1.50 q.	Feb. 15	Feb. 2
United Elastic Corp.	Com.	$0.10 q.	Mar. 23	Mar. 3

Rubber Industry in Europe

GREAT BRITAIN

Imports and Exports

Great Britain's imports of crude rubber, including latex, during 1934 reached the record figure of 4,741,712 centals of 100 pounds, more than double the amount for 1933: 2,267,396 centals. Reexports were 1,219,284 against 622,715 centals so that the amount of rubber actually retained in the country was 3,522,428 centals against 1,644,681 centals. Imports of gutta percha and balata were 27,131 against 19,301 centals, and of waste and reclaimed rubber, 37,561 against 23,545 centals.

Declines were fairly steep in exports of various manufactured goods, but increases in other lines offset these so that in the end 1934 exports were higher, compared with those of 1933. Footwear exports again showed a marked decline, being only 73,709 dozen pairs, value £101,327, against 115,116 dozen pairs, value £134,963, in 1933 and 153,475 dozen pairs, value £191,017, in 1932. Whereas the value of exports of tires and tubes had risen from £3,273,844 in 1932 to £3,382,944 in 1933, it declined to £3,058,808 in 1934. Only solid tires showed an increase, from £40,741 in 1933 to £48,092 in 1934.

A progressive decline is also noted in the value of exports of waterproof apparel. The comparative figures are £482,889 in 1932, £475,600 in 1933, and £450,078 in 1934; similarly with submarine telegraph and telephone cables, for which totals were £130,650 in 1932, £128,710 in 1933, and £79,160 in 1934. On the other hand exports of other insulated wires and cables increased markedly in 1934 when they rose to £1,245,478, against £963,539 in 1933 and £844,522 in 1932. Exports of belting and other rubber goods showed a similar satisfactory trend, totals for the former goods having risen from £138,918 to £167,453 and again to £209,839, and of the latter from £1,335,292 to £1,564,402 and again to £1,650,879.

Rubber Exhibition

The Rubber Exhibition being held at the Science Museum, South Kensington, gives as perfect an idea of the many-sidedness of the industry as can be expected, thanks to the wonderful cooperation of the leading scientific associations and manufacturers connected with the rubber industry. Starting from the ground up, so to speak, are a number of photographs, dioramas, and specimens to make clear the various operations in the development and maintenance of plantations, the propagation and care of trees, and the tapping systems. A model plantation factory, different machines, and numerous photographs illustrate the various installations and operations on estate factories.

Probably the most interesting section is that where rubber manufacturing processes as electro-deposition of latex, making dipped goods from latex, latex sponges, thread, are demonstrated. Here, too, films of the manufacture of footwear and tires are to be seen daily.

Methods of concentrating latex are shown in the science section. The compounding and vulcanizing of rubber and the various ingredients employed also receive much attention, and a variety of apparatus for controlling operations and testing materials is on view. Besides microscopes to study the size and the motion of rubber particles, and micro-manipulators for dissecting the rubber globule, appear a tintometer to express the color of latex numerically, a device for showing the fluorescence of rubber fillers in ultraviolet light, plastometers, viscosimeters, etc.

Articles in different stages of manufacture are to be seen in the section devoted to applications of rubber. Here, of course, the versatility of rubber is best appreciated; we see rubber in use in the chemical industry, in mining, in the construction of automobiles, in the manufacture of cables, hose, printing plates; in the kitchen, the bathroom, the hospital, etc.

Finally are the recent developments, as expanded chlorinated rubber, which is an extremely light material built up of minute air cells and said to be noninflammable; modified rubbers; rubber paints, etc.

British Notes

The Dunlop Rubber Co. recently launched its new 1935 tire, Dunlop 90, for which exceptional anti-skid properties are claimed. Other advantages listed for the tire are that the non-skid efficiency of the tire is retained until the tread is worn smooth; that the life of the tire is exceptional; that it reacts efficiently and evenly to braking and runs smoothly and quietly even at high speeds.

Close fitting and yet easily removable rubber boots can be produced when a process of dipping in liquid latex is employed instead of the usual methods, owing to the superior pliability of latex goods, we learn. Such boots are now being made at Dunlop's Liverpool factory. In the process used the canvas boot lining, impregnated with rubber in the usual way and provided with heel and toe reenforcements, is put on a last, dipped into suitably compounded latex, and then subjected to a bath in a fixing solution. The last two operations are repeated again; then the rubber heel and sole pieces are added, and the whole receives a final dip in the latex before being cured.

An improved type of machine for producing rubber powder after the de Schepper process has been completed at Amsterdam and is to be sent to Ceylon, the Rubber Powder Co., Ltd., announces. The new machine, which successfully went through a series of tests in Holland, is said to be capable of giving an output of three tons of powder a day, an amount that can be increased further by using a new type of sprayer. It is also learned that plans are afoot to form a new company with an authorized capital of £250,000 to take over the assets of the existing Rubber Powder Co., Ltd.

Members of the Tire Manufacturers' Conference have decided to increase the price of various types of tires, including wired type car covers, (H.D., Fort, and Standard), and tubes, which will be 10% more, and car covers and tubes, wired type, which will be 5% higher. The sections 3.50, 4.00, and 4.50 are not included. Prices for other types of tires as extra-low pressure, giant or motor cycle covers, and tubes remain unchanged.

European Notes

Effective January 15, 1935, used tire covers for cycles and motor vehicles may no longer be exported from Germany. This rule also applies to scrap tires. Only tires mounted on wheels of vehicles sent out of the country are exempt from this regulation.

Uniformity in the thickness of protective coatings of rubber, artificial resin, or lacquer on metal sheets and vessels is of great importance since irregularities affect the adhesion of the coverings as well as their heat conductivity. In measuring these layers the difficulty is that only one side of the material can be reached by a measuring apparatus. This difficulty seems to be solved effectively by an electromagnetic device recently introduced in Germany. This device records thicknesses from 1/100 mm. to 10 mm. so that all the usual linings and coatings from lacquer finishes to thick rubber linings can be tested with its aid.

A feature of the recent automobile

show in Paris that attracted much amused attention was the exhibition of motor vehicles of bygone days illustrating the evolution of the automobile. Among the newest cars one well-known make was equipped with tires in which the non-skid effect of the usual tread design was enhanced by cutting lateral grooves over the surface. This idea, it seems, was inspired by the excellent results obtained with a device for regrooving worn tire treads with parallel lateral grooves instead of longitudinal grooves, which was introduced on the French market a few years ago under the name of Adersol. The French firm in question now supplies all its new cars with tires that have this lateral grooving over the regular tread design.

Etablissements Bergougnan reports net profits of 7,648,672 francs over the year ended September 30, 1934, and the dividend has been fixed at 35 francs per share.

Compagnie du Caoutchouc Manufacture Dynamic has taken steps to reduce its capital from 3,300,000 to 1,320,000 francs.

Caoutchouc Reno booked a loss of 356,474 francs over the past business year; this must be added to the previous debit balance of 3,089,693 francs.

Considerable interest is being shown in various parts of the world in the Universal & International Exhibition, to be held in Brussels, Belgium, in April, 1935. It is hoped that the rubber industry, too, will be well represented.

Until recently automobile tires made in Poland did not enjoy much local demand. But now that these tires have been found to be fair products with the added advantage of costing considerably less than imported tires, demand is increasing, and Polish tire manufacturers are busier than they have been for some time.

The Ka-Pe-Ge- Katowicki Przemusl Gumowy, Katowice, Poland, has newly been established to manufacture technical rubber goods. The new concern is a sister firm of Krain & Fesser, Katowice.

The Rygowar Co., Warsaw, booked a loss of 709,930 zloty over the past year. To cover this loss the capital is to be reduced by 990,000 zloty and subsequently raised again by issuing new shares to the same amount.

Until 1932 the Bulgarian rubber industry expanded rapidly, and besides thirteen larger factories many smaller establishments arose. In the last two years, however, it has become evident that expansion was too rapid and that in the face of the crisis production could not be maintained at the previous level. Thus, output of footwear during the first half of 1934 was only 15,400 pairs against 36,900 pairs in the same period of 1933; while sales were 15,000 pairs against 34,200 pairs. This reduced business is also reflected in the imports of raw materials for the rubber industry, which in the first half of 1934 were valued at only 2,800,000 leva against 7,800,000 leva in the first half of 1933, and this figure despite the rise in the price of raw rubber.

International Rubber Regulation Committee

The International Rubber Regulation Committee held its monthly meeting January 29. The following statement gives the permissible exportable amounts and the provisionally reported net exports from the date of the introduction of the scheme until the end of 1934.

NET EXPORTS OF CRUDE RUBBER FROM COUNTRIES WITH VARIABLE QUOTAS

Countries	Permissible Exportable Amounts	Reported Net Exports (Provisional)	Excess (+) or Deficiency (—)
Malaya	256,200	243,971	—12,229
N.E.I.	178,933	180,392	+ 1,459
Ceylon	39,395	39,423	+ 28
India	3,483	2,989	— 494
Burma	2,617	2,277	— 340
North Borneo	6,100	6,396	+ 296
Sarawak	12,200	10,809	— 1,391
Total	498,928	486,257	—12,671

New England

(*Continued from page 59*)

Sponge Rubber President

Frederick M. Daley, president of the Sponge Rubber Products Co., Derby, Conn., since its organization in 1923, was born in Peabody, Mass., in 1897. After graduating from Dartmouth College, with an A.B. degree, in 1919 he entered the cost department of the United States Rubber Co. in Naugatuck, Conn., where he remained until joining the Sponge Rubber concern.

Mr. Daley is a member of the code authority, 156, sponge division, and in 1933 was chairman of the Derby NRA. He also belongs to the Derby Board of Trade and to the Highland Golf Club of Shelton.

The Armstrong Rubber Co., Inc., manufacturer of tires and tubes, West Haven, Conn., has over 2,500 direct factory representatives throughout New England and the eastern states. F. Machlin is treasurer of the Armstrong company.

F. H. Banbury, manager of the Banbury mixer department, Farrel-Birmingham Co., Inc., Ansonia, Conn., is on a business trip to southern and western states and Mexico. After a vacation in California he will visit the trade in Portland, Ore., Denver, Colo., and St. Louis, Mo. He will return home about April 1.

Tyer Rubber Co., Andover, Mass., at the annual stockholders' meeting, February 18, elected the following officers and directors: chairman, Sidney W. Bartlett, president since 1928; president, Hugh Bullock, succeeding Mr. Bartlett; vice presidents, Henry G. Tyer and George L. Lawrence; treasurer, Wallace E. Brimer, succeeding the late Walter E. Piper; and directors, George E. Abbott and Joseph Wiggin.

Manganese Salts in Plantation Rubber[1]

G. A. Sackett[2]

Abstract

THE use of manganese salts in crude rubber manufacture gives a product which, in gum stocks compounded with organic accelerators, has lower tensile strength and modulus and poorer age resistance than the control. In rubber-sulphur stocks it gives poorer tensile strength and modulus, but the age resistance is not seriously affected.

The effect of manganese on a tread stock is not so marked as it is in the gum stock, but the tensile strength is poorer, and there is definite indication of poorer age resistance. The use of an antioxidant improves the age resistance, but has no effect on the original tensile strength. The flex life is not affected, but the abrasion loss of the manganese-contaminated rubber is much greater than that of the control.

The use of manganese in any form in the manufacture of crude rubber should be avoided, as this rubber may be innocently used in a compound where its properties would be extremely detrimental to the service performance of the product made from it.

A rapid, accurate method for determining manganese in crude rubber developed by the author follows. A 20-gram sample of rubber is ashed in a large porcelain crucible, starting over a gas flame and finishing in an electric muffle furnace. After cooling, the ash is taken up with 25 ml. of a 35% solution of nitric acid and digested on the hot plate for about half an hour. It is then diluted with 25 ml. of distilled water and transferred, filtering if necessary, to an Erlenmeyer flask. Ten milliliters of a 10% silver nitrate solution are added to catalyze the oxidation reaction, and the mixture is brought to a boil; then 10 ml. of a 10% solution of ammonium persulphate are added, and the resultant mixture is allowed to stand for 5 or 10 minutes in order to develop fully the permanganate color. The mixture is cooled and diluted to approximately 100 ml. and titrated to the disappearance of the permanganate color in the usual manner, using a standard solution of sodium arsenite. A convenient concentration is 0.005 *N* equivalent to 0.055 mg. of manganese per ml. of solution. The reagents should be manganese-free.

[1] *Ind. Eng. Chem.*, Feb., 1935, pp. 172-76.
[2] The Goodyear Tire & Rubber Co., Akron, O.

Rubber Industry in Far East

INDIA

Imports

According to official information, India's imports of rubber goods during the year ended March 31, 1934, showed a decline as compared with those of the year before, the respective values having been 18,750,000 and 19,800,000 rupees. By contrast, the share of the United Kingdom rose from 8,000,000 to 11,600,000 rupees, and the percentage from 40 to 62. Tires and tubes constitute the bulk of the imports, and in the year under review the number of tires rose to 311,302 from 291,760 although the value fell to 11,300,000 from 12,600,000 rupees. Most of the tires came from the United Kingdom, whose share was 197,411 against 107,528, or almost double that of the preceding year.

Figures for the 6 months ending September, 1934, showed imports of tires amounting to 168,533, value 6,025,000 rupees, against 135,094 tires, value 4,875,000 rupees; entries of tubes rose from 123,985, value 650,000 rupees, to 166,884, value 900,000 rupees.

The duty of 30% or 5 annas per pair has to a certain extent curbed the import of Japanese rubber-soled shoes. It seems to have affected the imports of rubber-soled canvas shoes as a whole for whereas these were 3,358,141 pairs, value 1,600,000 rupees, in the 6 months ended September, 1933, they were only 1,537,956 pairs, value 875,000 rupees, in the corresponding period of 1934. Other rubber-soled shoes, however, increased from 41,391 pairs, value 25,000 rupees, to 108,220 pairs, value 50,000 rupees; and all rubber shoes from 433,519 pairs, value 200,000 rupees, to 525,241 pairs, value 250,000 rupees.

Attention is called to the recent introduction of specially manufactured wheels and axles fitted with rubber tires for use on bullock carts. This equipment not only gives a 50% greater load with the same tractive effort, but entails less strain on the animals, increases the pace of traffic, and effects a reduction in the expenditure on road maintenance, the official report says. To stimulate this entirely new source of revenue the Government of India in May, 1934, reduced the import duty on this equipment to 15% standard and 5% preferential. The Public Works Department and other users of transport are enthusiastic about these rubber-tired wheels, and it is hoped the lowered duty together with mass production may lead to a reduction in price to a figure which will attract the majority of bullock cart owners. There are said to be from 5 to 9 million bullock carts in India, which offers an attractive field for a sufficiently cheap tire.

Rubber Quotas

As soon as the basic quotas under restriction became known, protests arose in India against what was considered the unfair basis of calculation. Recently the United Planters' Association of South India sent a memorandum to the Indian Government stating that all large rubber producers in South India are unanimous in urging immediate revision of the present quotas for South India. A minimum quota of 11,000 tons in 1934 is suggested with 12,500 tons per annum during 1935-37 and 13,000 tons in 1938. Under the restriction scheme the allotments are 6,850 tons for 1934; 8,250 tons for 1935; 9,000 tons for each of the years 1936 and 1937; and 9,250 tons for 1938.

It was shown that whereas Indian Rubber Statistics for 1932, on which quotas have been calculated by the International Committee, credit South India with an area of only 70,986 acres, the figures collected by the Indian Rubber Licensing Committee for purposes of assessment show an area of 127,058 acres planted to rubber. Investigations by the latter body also proved that the figures before the International Committee did not include rubber exports from Indian State Ports, which from Alleppey, Travancore, averaged 1,100 tons a year over the period 1929-1932.

CEYLON

High Yielding Clones

Ceylon was fairly late in taking up bud-grafting seriously, and at the Rubber Research Scheme Experiment Station, Nivitigalakele, systematic development of suitable clones from local mother trees was only started about 8 years ago. However work in this direction is now progressing steadily, and there is gratifying cooperation with various estates. By the end of 1933 yield records were becoming available from 70 Ceylon clones established either on estates or at the Nivitigalakele Experiment Station. However the number of Ceylon clones of which data are sufficiently extensive and promising to merit publication remains small, says R. K. S. Murray in an article on Ceylon clones published by the Rubber Research Scheme of Ceylon. As a matter of fact foreign clones must still be used for commercial planting as Ceylon has developed no proved clones as yet.

Up to the present the clones developed at Nivitigalakele have been rather disappointing. The yields in many cases have been not much better than what might be expected from average seedlings; while none of the clones has yet given exceptional yields. The Hillcroft clones on Stennes Estate, on the other hand, are far more promising as regards yield, the average output per tree per annum of 3 clones budded in 1926 being 8, 6.2, and 10.3 pounds respectively. It is interesting to note that the clone that excels in yield is also remarkable for the uniformity of yield of the individual trees. By contrast one of the other Hillcroft clones displays equally marked variability, the average annual yield per tree for the poorest yielder being 2.1 pounds, and for the best no less than 18.2 pounds. The first samples of rubber from these clones gave somewhat unsatisfactory results as regards tensile strength and aging properties. However this is frequently the case in rubber from young trees, and it is expected the rubber will begin to improve as the clones mature.

In view of the interest in soft rubbers, it is worth noting that the rubber from one of the Hillcroft clones (HC28) has been found to be unusually soft, whether prepared in the form of sheet or crepe. This characteristic should make the clone of special value if it is retained as the trees grow older.

Some of the clones from mother trees on Milleniya and Wawulugala Estates are also promising, especially clone W 259 for which the average yield per tree over 1933 was 7 pounds for trees budded in 1927.

Exports

Customs data show that total shipments of rubber from Ceylon during 1934 were 183,935,828 pounds. Of this figure 6,606,820 pounds were reexports so that net Ceylon exports were 177,329,008 pounds.

NETHERLAND INDIA

Preparing Estate Rubber

The reopening of estates in Java and Sumatra during the latter part of 1933 was accompanied by marked interest concerning estate methods of preparing rubber. Consequently questionnaires were sent out early in 1934 to estates in Java and in East Coast of Sumatra, Atjeh, and Tapanoeli. From these it appears that formic acid continues to be the chief coagulant used. Experiment stations here do not encourage the use of sulphuric acid as a coagulant although it is cheap and, when used in the correct proportions, has little effect on the rubber. But with even a slight excess the deteriorating effect becomes very noticeable. Moreover, there is great danger of coolies being injured while handling it.

At the West Java Experiment Station tests were carried out with fermented sugar water as a coagulant. While a satisfactory coagulum was obtained and the price was less than that of formic acid, these advantages are more than offset by the costly installation required to prepare the coagulant on a large scale and the extra supervision and uncertainties its use entails.

Most rubber is still prepared in the form of sheets. In Sumatra the preparation of thin sheet appears to be gaining favor, for 11.2% of all the rubber was in the form of thin sheet of less than 2.5 mm. thick. In Java, however, only two estates make this kind of sheet. Sumatra is also beginning to turn out air-dried sheets, the output in 1933, the year under discussion, having been 1,596 kilos.

A new development in coagulating tanks is attracting much attention. They are now frequently supplied with partitions of ebonite, marketed under the trade name Arniet. The partitions are made in Sumatra by the Rubber Cultuur Mij. Amsterdam, and entire tanks of Arniet have also been made. There are still some imperfections to be overcome as regards the Arniet tanks; meantime developments are being watched with great interest not only because Arniet appears to be an eminently suitable material for coagulating tanks, but also because a new use for rubber will thus be found.

New processes for concentrating latex, developed by Dr. Kraay in Java and at the A.V.R.O.S. in Sumatra, respectively, are now being perfected and before long should be available for practical application on a commercial scale.

The packing of rubber in bales and mats instead of in plywood cases underwent considerable expansion in 1933 both in Java and more especially Sumatra where 5,675 tons of first quality rubber and 2,962 tons of lower grade rubber were packed in burlap, Hessian, or cotton bales; while 136 tons of first quality and 1,026 tons of lower grades were packed in mats. This, of course, does not include about 500 tons of scrap. Sumatra also shipped 8,224 tons of sprayed rubber in sacks, besides 14,926 tons of latex, about a third of which was concentrated. The latex was chiefly shipped in Mauser drums holding 110 liters, but the new 200-liter drums are replacing them.

The production of sole crepe increased considerably in Java during 1933 when 15 estates prepared 1,181 tons. In Sumatra it was found that 29 estates make sole crepe, but the output was not given. We learn that experiments have been undertaken in Sumatra to produce a white sole crepe without fractional coagulation. The best results were obtained when a white pigment was added. The sole crepe thus produced is harder than the usual kind, and it remains to be seen how the market will receive this new white sole crepe.

MALAYA

Root Diseases

Root diseases have always been among the most serious problems with which the rubber planter has to cope; so naturally the subject has received careful attention at the Rubber Research Institute. At a planters' conference the Institute pathologist, R. P. N. Napper, who has for years been studying root diseases, discussed the latest theories of their development. In each of the three recognized types of true root disease—white root disease caused by *Fomes lignosus*, red root disease caused by *Ganoderma pseudoferreum*, and brown root disease caused by *Fomes noxius*—the disease is propagated vegetatively by rhizomorph systems which spread underground in all directions in search of living roots upon which to fasten. Virgin forest areas in the tropics produce ideal conditions for the development of rhizomorphs, and it is suggested that similar systems exist in all virgin forest areas throughout the world and that the rubber industry could therefore not have escaped root disease unless the trees were planted on previously cultivated land.

If virgin jungle favors the formation of these systems, on the other hand, they are kept in a state of natural control by the equilibrium which exists under undisturbed jungle conditions. The trouble starts when the jungle is felled and burned and rubber is planted soon after, for then the equilibrium is disturbed and the parasites at the centers of infection can attack their new hosts with unchecked vigor. If the land had been left unplanted and clean-weeded for a prolonged period, the parasites would in time die for lack of nourishment. Or if the land were planted with cereal or vegetable crops, the frequent cultivation required would lead to the removal of all sources of infection, and root disease could not appear in subsequently planted rubber.

Here, said Mr. Napper, was the answer to the puzzling question as to why native small-holdings, where root disease is neglected, are often completely free of root disease; while large commercial plantations which spend thousands of dollars in control measures suffer serious damage. The large plantations, he explained, are usually established on virgin land and exposed to the infection left in the soil; whereas the small holdings are chiefly planted on old cultivated land in and near the village. This statement is further proved by the fact that estates planted on old sugar land are remarkably free from root disease.

Mr. Napper described the development of root disease in a plantation and then recommended control measures which consist of tree-to-tree inspection in young areas and the construction of isolation trenches for older rubber.

In connection with the theory of the development of root diseases, we recall that in Sumatra the natives clear the jungle land and take off two or three crops of rice before planting their rubber. However they allow the natural jungle plants to grow up with the rubber, only slashing back the forest growths from time to time while the rubber is young and at infrequent intervals at all times. In the light of what Mr. Napper has said, would this system not be an excellent one for estates to follow on newly cleared land? The activity of the parasites would be reduced by the clearing and subsequent planting of foodcrops and then would be kept in a state of natural control by the rapid re-establishment of jungle conditions.

New Liquid-Center Golf Ball

"Thrill" is a new liquid-center golf ball made by the Bon Dee Golf Ball Co., 1353 Beard Ave., Detroit, Mich. This hard-wound ball is said to give exceptional distance and to have that much-desired "click" found only in golf balls of the better grade.

Patents and Trade Marks

MACHINERY

United States

1,985,341. **Making Tread Mold Elements.** W. J. Fraser, Toronto, Ont., Canada.
1,985,356. **Cutter.** P. Van Cleef, assignor to Van Cleef Bros., both of Chicago, Ill.
1,985,482. **Cement Applier.** H. L. Chapin, Swampscott, and A. S. Johnson, Beverly, both in Mass., assignors to United Shoe Machinery Corp., Paterson, N. J.
1,985,673. **Valve Stem Tester.** L. R. Adams, assignor to Firestone Steel Products Co., both of Akron, O.
1,985,821. **Rubber Article Former.** S. B. Field, Holbrook, assignor to Archer Rubber Co., Milford, Mass.
1,986,092. **Tire Shaper.** A. O. Abbott, Jr., Grosse Pointe Park, assignor to Morgan & Wright, Detroit, Mich.
1,986,094. **Bead Former.** J. E. Allan, Fife Lake, assignor to Morgan & Wright, Detroit, both in Mich.
1,986,404. **Divided Material Distributer.** E. W. Madge and F. J. Payne, both of Birmingham, England, assignors to Dunlop Tire & Rubber Corp., Buffalo, N. Y.
1,986,637. **Footwear Mold.** L. H. L'Hollier, Waltham, assignor to Hood Rubber Co., Inc., Watertown, both in Mass.
1,987,173. **Upper and Foxing Presser.** E. A. Willey, Malden, Mass., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.
1,987,566. **Collapsible Drum.** T. H. Williams, assignor to National Rubber Machinery Co., both of Akron, O.
1,987,659. **Plastic Mixer.** F. H. Banbury, Ansonia, Conn.
1,987,827. **Sole Preparer.** C. E. Hood, Lynn, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.
1,987,829. **Article Coater.** A. S. Johnson, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.
1,987,890. **Strip Material Vulcanizer.** J. M. Bierer, Waban, assignor to Boston Woven Hose & Rubber Co., Cambridge, both in Mass.
1,987,908. **Tire Vulcanizing Mold.** C. E. Maynard, Northampton, Mass., assignor, by mesne assignments, to Fisk Rubber Corp., a corporation of Del.
1,987,926. **Pneumatic Tire Building Drum.** C. H. Desautels, Springfield, Mass., assignor, by mesne assignments, to Fisk Rubber Corp., a corporation of Del.
1,987,963. **Cable Insulation Jointer.** F. S. Malm, Millburn, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.
1,988,074. **Foxing Cementer.** S. J. Finn, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.
1,988,420. **Insulation Apparatus.** F. W. Jackson, Revere, assignor to I. G. Sigilman, Dorchester, Mass.
1,988,597. **Plasticity Tester.** E. Karrer, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,988,662. **Balloon Printer.** H. A. Myers, Toledo, O.
1,988,709. **Glove Dipping Form.** F. E. Barns, Chicago, Ill.
1,988,772. **Shoe Presser.** W. S. Ashton, assignor to Hood Rubber Co., Inc., both of Watertown, Mass.
1,988,787. **Plastic Material Embossing Roll.** F. D. Fowler, Newton, assignor to Hood Rubber Co., Inc., Watertown, both in Mass.
1,989,037. **Thickness Gage.** R. W. Brown, assignor to Firestone Tire & Rubber Co., both of Akron, O.
1,989,038. **Thickness Gage and Controller.** R. W. Brown, assignor to Firestone Tire & Rubber Co., both of Akron, O.
1,989,062. **Winder.** A. F. Pym, Swampscott, assignor, by direct and mesne assignments, to Sibley-Pym Corp., Lynn, both in Mass.

Dominion of Canada

347,109. **Tire Patch Beveler.** C. E. Dunlap, Sioux City, Iowa, U. S. A.
347,182. **Festooner.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of G. F. Wikle, Ann Arbor, Mich., U. S. A.
347,440. **Denture Apparatus.** C. M. Andrews, York, Neb., U. S. A.

United Kingdom

416,182. **Thickness Gage.** Firestone Tyre & Rubber Co., Ltd., Brentford. (Firestone Tire & Rubber Co., Akron, O., U. S. A.)
417,268. **Brush Mold.** M. Pearson, London.

PROCESS

United States

1,985,325. **Joint.** T. D. Nathan, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,986,106. **Continuous Length of Rubber Article.** W. A. Gibbons, Montclair, and E. G. Sturdevant, Passaic, both in N. J., assignors to Revere Rubber Co., Providence, R. I.
1,986,629. **Contoured Rubber Article.** F. Fenton, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,986,723. **Shoe.** G. Goddu, deceased, by I. W. Goddu, executrix, both of Winchester, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.
1,986,925. **Belt.** S. J. Finn, Beverly, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.
1,986,974. **Uniting Threads.** W. D. Kellogg, assignor to Mohawk Carpet Mills, Inc., both of Amsterdam, N. Y.
1,987,168. **Rubber Flooring.** F. C. Van Heurn, Amsterdam, Netherlands, assignor, by mesne assignments, to Patent & Licensing Corp., New York, N. Y.
1,988,604. **Lineman's Protective Sleeve.** A. B. Merrill, Akron, and C. C. Curtis, Cuyahoga Falls, both in O., assignors to B. F. Goodrich Co., New York, N. Y.
1,988,640. **Suction Roll.** H. G. Welsford, Montreal, assignor to Dominion Engineering Works, Ltd., Lachine, both in P. Q., Canada.
1,988,843. **Cushioning Body.** C. H. Heldenbrand, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,988,902. **Working Up Vulcanized Rubber Waste.** F. Keppeler, Berlin-Weissensee, Germany.
1,988,928. **Rubber Backed Fibrous Article.** G. W. Trobridge, Sutton Coldfield, assignor to Dunlop Rubber Co., Ltd., Birmingham, both in England.

Dominion of Canada

346,931. **Picture Transferring.** S. A. and R. J. Boyle, co-inventors, both of Bristol, Conn., U. S. A.
347,361. **Rubber Strip.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of G. De Porcellinis, Milan, Italy.
347,362. **Rubber Containing Material.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of E. W. Madge and F. J. Payne, co-inventors, both of Birmingham, England.
347,363. **Cellular Rubber.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of U. Pestalozza, Milan, Italy.

United Kingdom

416,354. **Driving Belt.** Telefonaktiebolaget L. M. Ericsson and W. T. Arnberg, both of Stockholm, Sweden.
416,904. **Rubber Goods.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands.
417,031. **Hard Rubber Dust.** R. F. McKay, Birmingham. (International Latex Processes, Ltd., St. Peter's Port, Channel Islands.)
417,830. **Utilizing Rubber Waste.** W. J. Tennant, London. (F. Kepeler, Berlin, Germany.)

CHEMICAL

United States

19,426 (Reissue). **Latex Coagulation.** S. B. Neiley, Winchester, assignor to Dewey & Almy Chemical Co., Cambridge, both in Mass.
19,434 (Reissue). **Treating Rubber Latex.** J. McGavack, Leonia, N. J., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.
1,985,261. **Rubber Composition.** J. J. O'Hare, No. Brookfield, Mass., assignor to American Rubber Products Corp., New York, N. Y.
1,985,896. **Coating Composition.** J. K. Hunt, assignor to E. I. du Pont de Nemours & Co., both of Wilmington, Del.
1,986,049. **Distilled Rubber Coating.** T. J. Fairley, Alexandria, assignor, by direct and mesne assignments, of ½ to W. J. Hunter and ½ to M. P. Hunter, both of Shreveport, all in La.

1,986,050. **Rubber Distillate.** T. J. Fairley, Alexandria, assignor, by direct and mesne assignments, of ½ to W. J. Hunter and ½ to M. P. Hunter, both of Shreveport, all in La.
1,986,051. **Varnish Gum.** T. J. Fairley, Alexandria, assignor, by direct and mesne assignments, of ½ to W. J. Hunter and ½ to M. P. Hunter, both of Shreveport, all in La.
1,986,389. **Rubber Compounding Ingredient.** A. B. Cowdery, Needham, Mass., and T. A. Bulifant, Maywood, N. J., assignors to Barrett Co., New York, N. Y.
1,986,463. **Accelerator.** C. W. Christensen, assignor to Rubber Service Laboratories Co., both of Akron, O.
1,987,171. **Caoutchouc Conversion Product.** E. Walz, Ludwigshafen a. Rhine, assignor to I. G. Farbenindustrie A. G., Frankfurt a. M., both in Germany.
1,987,203. **Shoe Bottom Filling Composition.** H. S. Miller, Quincy, and C. W. Sargent, Lynn, assignors to Beckwith Mfg. Co., Boston, all in Mass.
1,987,530. **Expansion Joint Material.** J. S. Hipple, Temple, Pa.
1,987,643 and 1,987,644. **Carbon Black.** E. B. Spear, Milford, N. H., and R. L. Moore, Mt. Lebanon, Pa., assignors to Thermatomic Carbon Co., New York, N. Y.
1,988,005. **Cable Conductor Impregnating Material.** J. J. Gilbert, Douglaston, N. Y., and F. S. Malm, Chicago, Ill., assignors to Bell Telephone Laboratories, Inc., New York, N. Y.
1,988,126. **Waterproof Sheet.** L. Kirschbraun, assignor to Patent & Licensing Corp., both of New York, N. Y.
1,988,438. **Accelerator.** S. M. Cadwell, Grosse Pointe Village, Mich., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.
1,988,448. **Rubber Conversion Product.** H. Hopff, F. Ebel, and E. Valkó, all of Ludwigshafen a. Rhine, assignors to I. G. Farbenindustrie A. G., Frankfurt a. M., all in Germany.
1,988,479. **Factice.** B. T. Brooks, Greenwich, Conn., assignor, by mesne assignments, to Standard Alcohol Co., Wilmington, Del.
1,988,483 and 1,988,484. **Colored Rubber Product.** E. G. Croakman, Akron, O., assignor to National Aniline & Chemical Co., Inc., New York, N. Y.

Dominion of Canada

347,181. **Accelerator.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. F. Tuley, Nutley, N. J., U. S. A.
347,198. **Adhesive.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of A. W. Holmberg, Naugatuck, Conn., U. S. A.
347,215. **Accelerator.** Rubber Service Laboratories Co., Akron, O., assignee of M. W. Harman, Nitro, W. Va., both in the U. S. A.
347,317. **Carbon Black.** W. B. Wiegand, Old Greenwich, Conn., U. S. A.
347,518. **Plastic Composition.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of H. L. Grupe, Scotia, and R. H. Kienle, Schenectady, coinventors, N. Y., U. S. A.

United Kingdom

416,918. **Accelerator.** Naugatuck Chemical Co., Naugatuck, assignee of H. O. Newman, Waterbury, both in Conn., U. S. A.
416,973. **Accelerator.** Goodyear Tire & Rubber Co., Akron, O., U. S. A.
417,046. **Rubber Composition.** B. D. Porritt and H. A. Daynes, both of Croydon, and H. Spence and P. Spence & Sons, Ltd., both of Manchester.
417,084. **Latex.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, and E. A. Murphy, Birmingham.
417,162. **Latex.** Naugatuck Chemical Co., Naugatuck, Conn., assignee of J. McGavack, Leonia, N. J., both in the U. S. A.
417,173 and 417,177. **Flexible Abrasive Article.** A. H. Stevens, London. (Minnesota Mining & Mfg. Co., St. Paul, Minn., U. S. A.)
417,194. **Halogenated Rubber Composition.** N. Bennett, Widnes, and Imperial Chemical Industries, Ltd., London.
417,234 and 417,243. **Flexible Abrasive Article.** A. H. Stevens, London. (Minnesota Mining & Mfg. Co., St. Paul, Minn., U. S. A.)
417,273. **Chlorinated Rubber Composition.** Dunlop Rubber Co., Ltd., London, and D. F. Twiss and J. A. Wilson, both of Birmingham.
417,481. **Latex.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands, and E. W. Madge, E. A. Murphy, and F. J. Payne, all of Birmingham.
417,501. **Vulcanization.** J. Y. Johnson, London. (Ternion A. G., Glarus, Switzerland.)
417,563. **Latex.** International Latex Processes, Ltd., St. Peter's Port, Channel Islands.
417,584. **Chlorinated Rubber Composition.** I. G. Farbenindustrie A. G., Frankfurt a. M., Germany.
417,660. **Fibrous Rubber Composition.** Filastic, Ltd., and P. Schidrowitz, both of London.
417,728. **Rubber Composition.** Telegraph Construction & Maintenance Co., Ltd., and J. N. Dean, both of London.
417,857. **Porous Rubber Composition.** H. Wallace & Co., Ltd., London, and A. Whitehead, Manchester.
417,912. **Rubber Derivative.** Rubber Growers' Association, Inc., H. P. Stevens, and W. Young, all of London.
417,948. **Latex.** H. W. Hutton, E. Croydon.
418,080. **Paint.** W. B. Wiegand, New York, N. Y., U. S. A.
418,096. **Cellulosic Composition.** I. G. Farbenindustrie A. G., Frankfurt a. M., Germany.
418,230. **Chlorinated Rubber Lacquer.** I. G. Farbenindustrie A. G., Frankfurt a. M., Germany.
418,348. **Electric Insulating Material.** British Thomson-Houston Co., Ltd., London.

GENERAL

United States

19,416 (Reissue). **Weather Strip.** C. E. McCormick, Royal Oak, Mich.
1,985,229. **Drilling Apparatus.** M. C. Allen, Chicago, Ill., assignor to Sullivan Machinery Co., a corporation of Mass.
1,985,307. **Pencil Adjustable Eraser.** W. F. Boast, Casper, Wyo.
1,985,432. **Pneumatic Cushion Mattress.** J. O. Tucker and L. R. Kirst, both of New Orleans, La.
1,985,484. **Floor Covering.** S. C. Clark, Pontiac, Mich., assignor to Baldwin Rubber Co., a corporation of Mich.
1,985,502. **Bath Spray.** S. Isenberg, Chicago, Ill.
1,985,551. **Printer's Apparatus.** H. J. Reardon, Chicago, Ill.
1,985,558. **Lunch Bucket Protector.** J. H. Alexander, Staunton, Ill.
1,985,578. **Sole and Heel.** A. L. Murray, Auburn, Ind.
1,985,759. **Tire Inflating Valve and Gage.** F. Baumgartner, Chicago, Ill.
1,985,781. **Joint.** G. H. Hufferd and M. P. Graham, both of Detroit, Mich., assignors to Thompson Products, Inc., Cleveland, O.
1,985,852. **Elastic Webbing.** S. F. Conant, Littleton, assignor to United Elastic Corp., Easthampton, Mass.
1,985,892. **Welting.** G. Goddu, Winchester, Mass., assignor to United Shoe Machinery Corp., Paterson, N. J.
1,985,909. **Refrigerator Window.** W. H. Ziepke, Hollis, N. Y., assignor to J. G. Braun Co., Inc., a corporation of Ill.
1,986,102. **Screening Machine.** D. Cole, El Paso, Tex.
1,986,273. **Lifting Jack.** D. A. Leffingwell, Alliance, O.
1,986,347. **Plug Connecter.** F. Kuhn, Detroit, and L. H. Thomas, Birmingham, assignors to American Electrical Heater Co., Detroit, all in Mich.
1,986,367. **Artificial Leather.** M. O. Schur, assignor to Brown Co., both of Berlin, N. H.
1,986,447. **Connecter or Coupling.** H. A. Rishel, Ambler, Pa.
1,986,504. **Sanitary Cup.** G. R. Cubbon, Brandon, Man., Canada.
1,986,519. **Suspenders.** T. O. Murray, Chicago, Ill.
1,986,682. **Police Club.** B. Schulz, Atlantic Highlands, N. J.
1,986,694. **Glass Gasket Strip.** C. H. Walker, Detroit, Mich.
1,986,697. **Air Ring.** M. E. Wilson, Port Angeles, Wash.
1,986,701. **Gate Bottom Seal.** H. Zimmermann, Dortmund, assignor to Vereinigte Stahlwerke A. G., Dusseldorf, both in Germany.
1,986,727. **Removable Heel.** C. Hall, Jr., Mexico, D. F., Mexico.
1,986,744. **Antirattler.** R. D. Muxworthy, Medicine Hat, Alta., Canada.
1,986,772. **Antirattler.** H. Golden, assignor to Magna Products Corp., both of New York, N. Y.
1,986,773. **Curtain Construction.** W. S. Hamm, Elkhart, Ind., assignor to Adlake Co., Chicago, Ill.
1,986,841. **Corset.** S. T. Metz, Jamaica, N. Y.
1,986,865. **Track for Tracklaying Vehicles.** W. H. Tschappat, United States Army, Washington, D. C.
1,986,887. **Liquid Material Receptacle.** A. Frieden, New Rochelle, N. Y.
1,986,991. **Fish Lure.** M. E. Wilson, Warwick, N. Y.
1,987,017. **Bent Valve Stem Adjustable Template.** L. M. Littlefield, Chicopee Falls, Mass., assignor to A. Schrader's Son, Inc., Brooklyn, N. Y.
1,987,020. **Wash Bowl Sanitary Insert.** O. Looft, assignor, by direct and mesne assignments, of 15% to F. Baumen and 10% to J. Taner, all of Tracy, and 5% to P. P. Cianettoni, Banta, all in Calif.
1,987,044. **Golf Club Shaft.** H. G. Barrett, Wilmette, assignor, by mesne assignments, to General Automatic Corp., Chicago, both in Ill.

1,987,132. **Baby Bottle Holder.** T. Shine, U. S. Navy, Norfolk, Va.
1,987,156. **Collapsible Tube Closure.** L. Paparello, assignor of 45% to W. F. Gilbert, both of Brooklyn, N. Y.
1,987,163. **Pressure Indicator Valve.** J. L. Swezey, Compton, Calif., assignor to Pneumatic Indicator Co.
1,987,189. **Multiple Leaf Spring Clip.** H. D. Geyer, Dayton, O., assignor, by mesne assignments, to General Motors Corp., Detroit, Mich.
1,987,225. **Laminated Paper Board.** S. Bergstein, Cincinnati, O.
1,987,226. **Noise Producer.** G. Boden, assignor to Scovill Mfg. Co., both of Waterbury, Conn.
1,987,253. **Garment Support.** A. J. Fishbone, New York, N. Y.
1,987,350. **Tire.** R. M. Reel, assignor to Pharis Tire & Rubber Co., both of Newark, O.
1,987,369. **Garment.** D. C. O'Shea, Chicago, Ill.
1,987,390. **Massage Pad.** E. D. Davis, assignor to Boye Needle Co., both of Chicago, Ill.
1,987,411. **Motor Vehicle Shock Absorber.** A. Muller, Bronx, N. Y.
1,987,432. **Truss.** F. E. Chesterman, Noble, Pa.
1,987,476. **Typewriter Eraser.** L. J. Hart, New York, N. Y.
1,987,486. **Leak Detector.** W. G. Michaelis, Morton, Minn.
1,987,494. **Emergency Tire.** E. Schulte, Bronxville, assignor of 1/3 to A. H. McLanahan, New York, and 1/3 to G. W. Dusenbury, Bronxville, all in N. Y.
1,987,527. **Suspenders.** H. S. Frank, assignor to A. Stein & Co., both of Chicago, Ill.
1,987,573. **Composite Rubber Article.** C. H. Ingwer, assignor to I. T. S. Co., both of Elyria, O.
1,987,585. **Mat.** L. H. Diehl, assignor to Detroit Gasket & Mfg. Co., both of Detroit, Mich.
1,987,605. **Auto Topping.** E. T. Croasdale, Bridgeport, and R. Morgan, Fairfield, both in Conn., assignors to E. I. du Pont de Nemours & Co., Wilmington, Del.
1,987,753. **Belt Drive.** E. J. Schmidt, Chicago, Ill., assignor to Dayton Rubber Mfg. Co., Dayton, O.
1,987,755. **Radio Static Shield.** M. S. Skaer and E. Holcomb, both of Pittsburg, Kan.
1,987,782. **Toe Protector.** C. D. Mason, assignor to Mishawaka Rubber & Woolen Mfg. Co., both of Mishawaka, Ind.
1,987,806. **Heel Rest.** L. Stark, Brooklyn, assignor to Kastar Specialty Mfg. Co., Inc., New York, both in N. Y.
1,987,837. **Portable Grinder.** A. W. Mall, Chicago, Ill.
1,987,918. **Electrical Conductor.** T. D. Waring and J. Bolingbroke, both of Hamilton, Ont., Canada, assignors to Standard Underground Cable Co. of Canada, Ltd.
1,987,955. **Cow Milker.** C. H. Hapgood, Nutley, N. J., assignor to De Laval Separator Co., New York, N. Y.
1,987,960. **Typewriter Key Cushion.** O. Kretchmer, Newark, N. J., assignor to Peerless Key Co., Inc., New York, N. Y.
1,988,035. **Carbonated Beverage Installation.** E. Fernholz, Berlin, Germany.
1,988,111. **Storage Battery.** C. J. Dunzweiler, assignor to Willard Storage Battery Co., both of Cleveland, O.
1,988,128. **Footwear.** H. Malm, New York, N. Y.
1,988,198. **Plumbing Flushing Device.** A. J. German, Detroit, assignor to A. R. Reno, River Rouge, both in Mich.
1,988,248. **Headwear.** C. E. Lewis, Truro, N. S., Canada.
1,988,279. **Cable Terminal and Joint.** E. Kirch, Berlin-Oberschoneweide, Germany, assignor to General Electric Co., a corporation of N. Y.
1,988,292. **V-Belt.** C. W. Yelm, assignor to Gates Rubber Co., both of Denver, Colo.
1,988,321. **Electric Socket.** F. C. Kollath, Chicago, and D. Woodhead, Evanston, both in Ill.
1,988,352. **Automobile Wheel.** L. Galindo, Santiago, Chile.
1,988,397. **Well Packer.** F. A. Reed, Butler, Pa.
1,988,415. **Trolley Pole Head.** E. F. Burdette, Akron, assignor of 1/2 to F. P. Obenchain, Cleveland, both in O.
1,988,431. **Side-Driving Type Belt.** E. H. Weber, assignor to Gates Rubber Co., both of Denver, Colo.
1,988,435. **Lineman's Protective Device.** J. D. Beebe, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,988,491. **Spinning Roll Covering.** E. Hazell, New York, N. Y., assignor to Revere Rubber Co., Providence, R. I.
1,988,538. **Disk Cutter.** C. Brown, Ford City, Pa., assignor to Pittsburgh Plate Glass Co., a corporation of Pa.
1,988,557. **Toothbrush and Paste Container.** R. Jecker, Lausen, Switzerland.
1,988,562. **Captive Balloon.** J. Letourneur, Versailles, France.
1,988,600. **Oil and Fuel Pipe Safety Device.** A. D. Maclachlan, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.
1,988,623. **Fountain Pen.** E. Hugetz, New York, N. Y.
1,988,624. **Blood Transfusion Device.** R. P. Kipp, Ossining, N. Y.
1,988,661. **Container Closure.** T. W. Miller, assignor to Faultless Rubber Co., both of Ashland, O.
1,988,671. **Automobile.** W. B. Stout, Detroit, Mich.
1,988,722. **Seam Construction.** F. S. de Beer, Albany, N. Y.
1,988,784. **Sport Shoe.** G. B. Carrier, Hudson, assignor to Firestone Footwear Co., Boston, both in Mass.
1,988,792. **Dual Wheel.** E. L. Harry, Detroit, Mich.
1,988,825. **Mat.** C. F. Barker, assignor to Durable Mat Co. (Canada), Ltd., both of Victoria, B. C., Canada.
1,988,828. **Mat.** A. Bianco, assignor to Durable Mat Co. (Canada), Ltd., both of Victoria, B. C., Canada.
1,988,852. **Container Closure.** T. W. Miller, assignor to Faultless Rubber Co., both of Ashland, O.
1,988,901. **Slicer or Splitter.** J. W. Hoefling, Chico, Calif.
1,988,913. **Typewriter.** G. Modigliani, assignor to Ing. C. Olivetti & C., both of Ivrea, Italy.
1,989,008. **Catamenial Appliance.** I. B. Hammond, Danbury, Conn.
1,989,023. **Hair Waver.** H. M. Powell, Philadelphia, Pa.
1,989,040. **Girdle.** H. C. Gingrich, assignor to Iris Knitting Corp., both of Pottstown, Pa.
1,989,058. **Vibrator.** S. J. Krivig, Hillside, assignor to Baker & Co., Inc., Newark, both in N. J.
1,989,060. **Bottle Attachment.** H. S. Liddick, Belmont, assignor to Davidson Rubber Co., Boston, both in Mass.
1,989,066. **Cordage.** K. R. Shaw, assignor to United Elastic Corp., both of Easthampton, Mass.

Dominion of Canada

346,941. **Ankle and Arch Support.** J. J. Cartledge, Guelph, Ont.
346,966. **Horseshoe.** W. H. Laws, Sr., Hamilton, Ont.
347,036. **Athletic Supporter.** Johnson & Johnson, Ltd., Montreal, P. Q., assignee of J. W. Luther, Highland Park, N. J., U. S. A.
347,078. **Electric Cord Plug.** Viceroy Mfg. Co., Ltd., assignee of L. J. Clayton, both of Toronto, Ont.
347,130. **Padded Horseshoe Calk.** E. Matthews, Hamilton, Ont.
347,137. **Printing Press.** H. J. Reardon, Chicago, Ill., U. S. A.
347,158. **Plug Connecter.** Belden Mfg. Co., Chicago, assignee of H. H. Wermine, Villa Park, both in Ill., U. S. A.
347,208. **X-Ray Installation.** N. V. Philips' Gloeilampenfabrieken, assignee of W. H. Boldingh, both of Eindhoven, Holland.
347,275. **Bottle Closure.** W. K. Dalglish, Toronto, Ont.
347,306. **Foot Corrective Device.** R. V. Parsons, Johnstown, Pa., U. S. A.
347,307. **Wheel.** E. H. Piron, Detroit, Mich., U. S. A.
347,329. **Adhesive Applicator.** American Crayon Co., assignee of F. B. Cooney, both of Sandusky, O., U. S. A.
347,436. **Valve.** A. J. and I. F. Fausek, co-inventors, both of Clayton, Mo., U. S. A.
347,457. **Hose Coupling.** H. W. Goodall, Aldan, Pa., U. S. A.
347,476. **Shoe Tread Member.** G. F. Quinn, Beachmont, Mass., U. S. A.
347,484. **Wagon Step Cover.** J. A. Simpson, Toronto, Ont.
347,527. **Tire.** Chrysler Corp., assignee of R. K. Lee, both of Highland Park, Mich., U. S. A.

United Kingdom

415,097. **Aircraft Wheel Brake.** India Rubber, Gutta Percha & Telegraph Works Co., Ltd., and F. J. Tarris, both of London.
415,187. **Centrifugal Pump.** Tangyes, Ltd., and B. Wilks, both of Birmingham.
415,629. **Cooling Cylinders.** N. O. Kohler, Stockholm, Sweden.
415,791. **Endless Belt Elevator.** H. W. Cadman and Sovex, Ltd., both of London.
415,829. **Endless Track Vehicle.** Vickers-Armstrongs, Ltd., Westminster, and J. V. Carden, Frimley.
415,909. **Drinking Vessel.** J. Baer, Munich, Germany.
416,031. **Pulley.** A. R. Alston and J. Marr & Son, Ltd., both of Fleetwood.
416,165. **Centerless Lapping Machine.** Cincinnati Grinders, Inc., Cincinnati, assignee of F. J. Theler, Hamlet; G. V. Johnston, Loveland; and W. Peaslee, Cincinnati, all in O., U. S. A.
416,349. **Blasting Fuse.** C. E. Sosson, Saltcoats; H. Barlow, Falkirk; and Imperial Chemical Industries, Ltd., London.
416,380. **Sign Supporter.** S. J. Smith, London.

416,381. **Paper Tube.** A. S. Lowry, Romiley.
416,390. **Railway Vehicle Suspension.** Sentinel Waggon Works, Ltd., Westminster, and A. C. Hutt, Shrewsbury.
416,415. **Boot Machine.** United Shoe Machinery Corp., Boston, assignee of C. G. Brostrom, Lynn, both in Mass., U. S. A.
416,417. **Tire Pressure Gage.** B. Jablonsky, London.
416,437. **Footwear.** Magyar Ruggyantaarugyar Reszvenytarsasag and P. Klein, both of Budapest, Hungary.
416,487. **Shoe Upper Material.** W. Mycroft, Long Eaton.
416,497. **Draught Excluder.** C. Argyle, near Alfreton.
416,512. **Secret Combination Switch.** J. A. Rennie, London.
416,536. **Concrete Pump.** E. Handl, Amsterdam, Holland.
416,548. **Endless Track Vehicle.** L. Renault, Seine, France.
416,610. **Door Stop.** F. R. Ram, London.
416,628. **Tape.** A. Boudo, Paris, France.
416,643. **Ball Cleaner.** S. Hay, London.
416,648. **Fountain Pen.** M. S. Finburgh, London.
416,654. **Athletic Supporter.** Johnson & Johnson (Gt. Britain), Ltd., Slough. (Johnson & Johnson, New Brunswick, N. J., U. S. A.)
416,655. **Surgical Dressing.** Johnson & Johnson (Gt. Britain), Ltd., Slough. (Johnson & Johnson, New Brunswick, N. J., U. S. A.)
416,670. **Map.** H. S. Davis, Harrow.
416,690. **Plug Coupling Combined with Switch.** General Electric Co., Ltd., London, and W. Manchester, Wembley.
416,694. **Trousers.** J. Walker, Leeds.
416,701. **Tire Deflation Indicator.** Dunlop Rubber Co., Ltd., London, and W. E. Hardeman and R. F. Daw, both of Birmingham.
416,722. **Beer Cooler and Heater.** T. S. and F. L. S. Murray, London.
416,788. **Cable.** F. Meiwald, Vienna, Austria.
416,819. **Scouring Pad.** C. G. O. Duron and A. F. Deshayes, both of Paris, France.
416,824. **Doll.** Hungarian Rubber Goods Factory, Ltd., Budapest, Hungary.
416,828. **Pantaloon Outer Garment.** C. E. Martin, Minneapolis, Minn., U. S. A.
416,833. **Railway Wheel.** E. Bugatti, Molsheim, Bas-Rhin, France.
416,842. **Hair Waver.** C. H. Bongartz, Twickenham, and S. Marcell, London.
416,845. **Aircraft Navigation Lamp.** H. C. Peirce and A. M. Desoutter, both of London.
416,858. **Boot Machine.** C. H. Millman and G. H. Dove, both of Leicester.
416,898. **Saw.** H. Tigges, Langenberg, Rhineland, Germany.
416,905. **Weft Thread Straightener.** C. H. Weisbach Kommandit - Ges., Chemnitz, Germany.
416,948. **Golf Practicing Appliance.** J. G. Brown, London.
416,981. **Accumulator.** J. Lucas, Ltd., and H. E. Clarke, both of Birmingham.
417,058. **Show Card Holder.** Sussex Glass Bevelling Co., Ltd., Brighton, and G. Page, W. Hove.
417,071. **Hygrometric Apparatus.** C. L. Burdick, London.
417,088. **Aircraft Wheel.** B. Von Loutzkoy, Berlin, Germany.
417,157. **Wearing Apparel Fastening.** H. Schroder, Berlin, Germany.
417,168. **Fibrous Material Drier.** C. F. Brodin, Stockholm, Sweden.
417,187. **Hands and Feet Treater.** J. B. De Kurowski, London.
417,208. **Cable.** St. Helen's Cable & Rubber Co., Ltd., Slough, and H. C. Harrison, Maidenhead.
417,211. **Automobile Rear Trunk.** Soc. Anon. Des Usines Chausson, Seine, France.
417,334. **Aircraft Oil Cooler.** Bristol Aeroplane Co., Ltd., A. H. R. Fedden, and F. Mayer, all of Bristol.
417,370. **Flushing Valve.** Twyfords, Ltd., and J. T. Webster, both of Hanley.
417,375. **Loom Shuttle.** Maschinen-Fabrik Ruti Vorm. C. Honegger, Zurich, Switzerland.
417,426. **Pneumatic Power Transmission.** M. P. Arnouil, Libos, Lot-et-Garonne, France.
417,507. **Drip Catcher.** D. D. Harrison, Maidenhead.
417,509. **Tire.** E. R. Case, Toronto, Canada.
417,558. **Table Mat.** M. Schwinger, Bielefeld, Germany.
417,710. **Stocking Suspenders.** E. Ericson, Coconut Grove, Fla., U. S. A.
417,718. **Phonographic Recorder and Reproducer.** Electric & Musical Industries, Ltd., Hayes, and A. D. Blumlein, London.
417,720. **Vacuum Cleaner.** Electrolux, Ltd., London, assignee of Inventia Patent-Verwertungs-Ges., Schaffhausen, Switzerland.
417,809. **Tire.** E. G. Budd Mfg. Co., Philadelphia, assignee of E. G. Budd, Germantown, both in Pa., U. S. A.
417,817. **Railway Wheel.** E. H. Piron, Detroit, Mich., U. S. A.
417,818. **Railway Wheel.** C. F. Hirshfeld, Detroit, Mich., U. S. A.
417,990. **Tire.** C. Bradley, Nashville, Tenn., U. S. A.
417,999. **Polymerization Apparatus.** Triplex Safety Glass Co., Ltd., London, and L. V. D. Scorah and J. Wilson, both of Birmingham.
418,073. **Yielding Bearing.** Dunlop Rubber Co., Ltd., London, and S. Sadler, Birmingham.
418,075. **Filter.** Aktiebolaget Kemiska Patenter, Landskrona, Sweden.

TRADE MARKS

United States

320,299. **Stayput.** Printers' rolls. Dayton Rubber Mfg. Co., Akron, O.
320,301. **Monarch Certified.** Heels. Monarch Rubber Co., Inc., Baltimore, Md.
320,321. **Nufashond.** Sanitary belts and undergarments. Narrow Fabric Co., Reading, Pa.
320,326. **Kleenit.** Rubber composition for cleaning. Eberhard Faber Pencil Co., Brooklyn, N. Y.
320,336. **Dart Soles.** Soles and heels. S. H. Kress & Co., New York, N. Y.
320,345. **Zip Cord.** Electrical wire. United States Rubber Co., New York, N. Y.
320,416. **Criterion.** Druggists' sundries. B. F. Goodrich Co., New York, N. Y.
320,445. **Medisk.** Medicated corn plasters and pads. Scholl Mfg. Co., Inc., Chicago, Ill.
320,485. **Honey-boy.** Golf balls, etc. L. A. Young Co., Detroit, Mich.
320,486. **Sir Walter.** Golf balls, etc. L. A. Young Co., Detroit, Mich.
320,506. **Pluralastic.** Narrow elastic fabrics. United Elastic Corp., Easthampton, Mass.
320,507. **Pluralastic.** Corset and other wide elastic fabrics. United Elastic Corp., Easthampton, Mass.
320,511. Label containing representation of a mortar and pestle and an aged man's head peering into a microscope, and the words: **"Recommended by Leading Physicians. X-Ray Genuine Liquid Latex. Disease Preventative."** Prophylactic rubber articles. G. Aaronoff, doing business as Aaronoff Rubber Co., Brooklyn, N. Y.
320,524. Circle consisting of link chains in the center of which appears a representation of a flaming torch. Druggists' sundries. B. F. Goodrich Co., New York, N. Y.
320,530. Fanciful design containing representation of a man running. Corn and callous pads, metatarsal, arch, and ankle supports, callous cushions, bunion shields and pads, heel cushions and cups, and arch binders. Stride Products Corp., Cleveland, O.
320,540. **"Needled."** Golf balls. A. G. Spalding & Bros., New York, N. Y.
320,564. **Pace-maker.** Golf balls, etc. Crawford, McGregor & Canby Co., Dayton, O.
320,575. Double circle containing the word: **"Winner"** in the outer one and a representation of a runner reaching the goal in the inner circle. Elastic athletic supporters, surgical trusses, abdominal supporters, elastic hosiery, and suspensories. Chesterman-Leeland Co., Philadelphia, Pa.
320,578. **Silver Duke.** Golf balls. India Rubber, Gutta Percha & Telegraph Works Co., Ltd., London, England.
320,617. **Junior Atlas.** Tires and tubes. Atlas Supply Co., Newark, N. J.
320,643. **Story of Mankind.** Balls, etc. Stephen Slesinger, Inc., New York, N. Y.
320,656. Representation of a garter grip. Hose supporters and grips. Ansonia O & C Co., Ansonia, Conn.
320,666. **Satina.** Electrical wire. United States Rubber Co., New York, N. Y.
320,717. Label containing fanciful design and the word: **"Jewel-Ray."** Raincoats and capes. Sherman Bros. Rainwear Corp., New York, N. Y.
320,809. **Stride.** Corn and callous pads, metatarsal, arch, and ankle supports, callous cushions, bunion shields and pads, heel cushions and cups, and arch binders. Stride Products Corp., Cleveland, O.
320,845. **Pennsylvania.** Pneumatic tires. Pennsylvania Rubber Co. of America, Jeannette, Pa.
320,870. **"Chamois-Flex."** Reducing girdles, corsets, and brassieres. I. B. Kleinert Rubber Co., New York, N. Y.
320,898. **America's Favorite Son.** Tires. Fisk Rubber Corp., Chicopee Falls, Mass.
320,925. Picture consisting of a representation of a lady's profile, and below it the words: **"Lady Douglas."** Soles and heels, etc. W. L. Douglas Shoe Co., Montello, Brockton, Mass.
320,945. **"The Pullastic."** Elastic hat

(Continued on page 78)

Market Reviews

CRUDE RUBBER

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES

Futures	Dec. 29	Feb. 2	Feb. 9	Feb. 16	Feb. 23
Jan.	12.95	.....	.....	.....	.....
Feb.	13.06	12.70	13.13	12.90	13.05
Mar.	13.18	12.74	13.20	12.97	13.13
May	13.37	12.90	13.39	13.10	13.30
July	13.58	13.03	13.52	13.25	13.43
Sept.	13.77	13.19	13.68	13.42	13.60
Oct	13.87	13.25	13.78	13.49	13.68
Nov.	13.97	13.34	13.85	13.58	13.76
Dec.	.....	13.43	13.93	13.69	13.84
Jan.	.....	13.52	14.02	13.76	13.93
Volume for week (tons) ...	6,910	22,310	14,470	13,130	26,380

THE above table gives the nearest first and last week-end closing prices of the month previous to that under review, also the week-end closing prices of each week of this review. This plan permits tracing at a glance the trend of prices on each future for approximately 2 consecutive months.

During January rubber futures reflected the nervousness felt because of the uncertainty of the outcome of the Supreme Court's findings regarding the gold cases. While fluctuations in general were small, the trend was downward. Marked activity in the rubber manufacturing industry and the apparent effectiveness of restriction both combine to give an undertone of price stability that prevents far reaching bearish reactions despite the domestic economic considerations.

Week ended February 2. The fore part of this week brought further depression of prices due to foreign selling influenced, no doubt to some extent, by the gold situation here; unsettled state of commodities pools in London; and the bankruptcy of E. A. Strauss Co., an important commodity house in London, with branches in Bombay and Calcutta. Prices recovered somewhat by mid-week and held steadily during the remainder of the period as foreign selling pressure lifted, other commodities turned upwardly, and it became known that the Strauss rubber stocks would not be dumped on to the market. The week closed 2 to 7 points higher than the previous week.

Week ended February 9. Quiet trading, but price firmness characterized exchange activities Monday and Tuesday. Singapore markets were closed for Chinese New Year holidays. A Reuter's message from Batavia reported that the D.E.I. Government has authorized civil service officials to prepare to enforce individual native restriction after April 1. This order will affect Tapanceli, Achin, and the East Coast of Sumatra, thus bringing this type of restriction to bear on 29% of the total D.E.I. native territory.

This Government has also ordered an inquiry into the pepper situation, speculation in which has caused a serious unsettled condition of commodities in the London market, resulting in the collapse of the Strauss firm and the weakening of various others. The acuteness of this situation in London affected the rubber markets both there and here, with a break of 7 to 10 points occurring Wednesday, March closed 12.68¢ against 12.78 the previous day. With restoration of confidence through private advices that the commodity condition in London was stabilized, speculative interests renewed their activities. This and the further stimulation of confidence that the United States Government's gold policy would be upheld brought about an upturn of trading and prices that closed the period with all futures above 13¢ and showing gains of 43 to 53 points over the previous week's close.

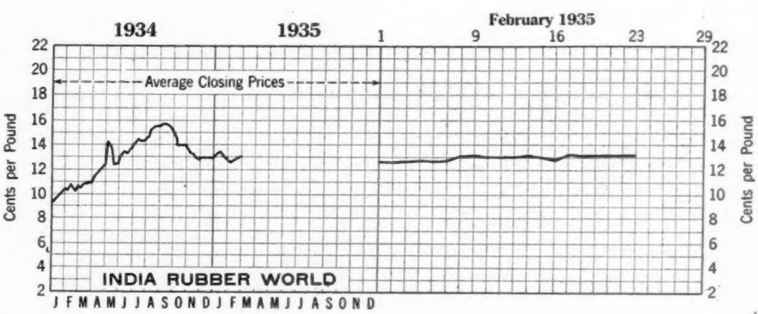
Week ended February 16. A price recession of 23 to 29 points reveals the general sentiment prevailing in the futures market during this period. Failure of the Supreme Court to produce a decision on the gold cases and news of three additional London trading house collapses started the week with much discouragement. Speculative and hedge selling predominated the scattered disposition to buy, with downward trends resulting and fluctuations held to narrow margins. The market displayed firmness, despite the gloomy atmosphere, because of continued assurances of the effectiveness of restriction policies and increased activity in manufacturing as evidenced by January consumption exceeding that of December by 28.5% and that of January, 1934, by 19.9%. Reports that tire prices were being slashed 50% by manufacturers with company owned stores, however, were not of a stimulating effect.

Week ended February 23. A rush of buying activity took possession of the Commodity Exchange following the Supreme Court decision upholding the Government policy. Speculative buying and hurried short covering started this period, with gains at the close of 45 to 49 points above the previous close. Activity continued the following day, but of a liquidating and profit taking variety, resulting in rapid price recessions of 26 to 29 points. Dull and uninteresting trading prevailed during the remainder of this period, with but slight price fluctuation. This seemed to be influenced mainly by a renewed pessimism in London commodities due to discovery of further distressing ramifications of the speculative pool which had recently resulted in the collapse of several large trading houses of London. The period closed with gains of 16 to 20 points over the previous week, May, for instance, 13.30¢ as against 13.10¢.

New York Outside Market

The firm price levels for No. 1 smoked sheet that characterized November and December, 1934, continued until the latter part of January, 1935, when the same factors that were depressing the futures market caused spot prices to break back through the 13¢ level. The trend from the beginning of December to the end of the period covered by this review will be observed from the following week-end closing prices: December 1, 13 1/16¢; January 5, 13½; January 26, 12⅝; February 2, 12⅝; February 9, 13⅛; February 16, 12⅞; and February 23, 13 1/16.

Week ended February 2. Factory demand during the entire period was steady, but too light to affect prices to



New York Outside Market—Spot Closing Prices Ribbed Smoked Sheets

a measurable degree. Closing prices were the same as the week before. A summary of the effects of the first 7 months of restriction was reported by International Rubber Regulation Committee which disclosed that Netherland India, Ceylon, and North Borneo had exported a total of 1,783 tons in excess of their quotas; whereas Malaya, India, Burma, and Sarawak lacked 14,454 tons of realizing their quotas, a net deficiency of 12,671 tons. The R.M.A. reports a production of 3,778,418 tires for December, 1934, 13.1% over November and 22.6% over December, 1933. The total production in 1934 was 47,232,745 casings, 4.3% over 1933 and 17.8% over 1932.

Week ended February 9. Factory demand continued very light; apparently manufacturers were restricting purchases as much as possible until the gold question could be finally settled. Prices, however, moved gradually into higher ground, breaking through 13¢ Friday and closing at 13⅛¢ Saturday. This rise came about as the result of values here having fallen out of line with those of the Far East, thus creating a condition whereby deliveries to factories could be replaced by dealers only at higher prices. In addition to this condition London banks had succeeded in stabilizing the chaotic foreign commodity situation, thus restoring confidence and prices, which had fallen more than conditions justified.

Week ended February 16. Following the pattern set by the futures market, the price of No. 1 smoked sheet dropped ¼¢ to close this period at 12⅞¢. Factory demand was light at prevailing prices, but during the latter part of the week particularly was strong at under-market figures, although sellers were influenced but little since Far Eastern price firmness prevented equitable replacement. R.M.A. reported January consumption of rubber by United States manufacturers of 47,103 tons against 36,662 tons in December, 1934, an increase of 28.5%. As against January, 1934, the increase was 19.9%. Crude rubber stocks on hand January 31, 1935, were 346,084 tons; while those of December 31, 1934 were 352,632, and 370,979 January 31, 1934.

Week ended February 23. In contrast to the futures market, activity was not so marked as a result of the favorable Supreme Court gold decision, although the spot price for No. 1 ribbed smoked sheet strengthened ½¢ to 13 5/16¢ per pound, apparently more out of sympathy with the futures market than because of factory demand. The price reacted quickly to 13 1/16¢ where it remained during the remainder of this very quiet period. A strike occurring in one of the smaller rubber companies seemed to engage the attention of factory interests more than rubber buying.

New York Quotations

New York outside market rubber quotations in cents per pound

	Feb. 23, 1934	Jan. 26, 1935	Feb. 23, 1935
Plantations			
Rubber latex, normal ....gal.	50	54	54
Sheet			
Ribbed smoked, spot	10⅝	12¾/12⅞	13⅛
Feb.-Mar.	10⅝	....	13⅛/13¼
Apr.-June	10⅞	13 /13¼	13 5/16/13⅜
July-Sept.	11¼	13⅜/13½	13 9/16/13⅝
Crepe			
No. 1 thin latex, spot	12¼	13 /13⅛	13½
Feb-Mar.	12⅝	....	13½/13⅝
Apr.-June	12¾	13⅜/13½	13¾/13⅞
July-Sept.	13	13⅝/13¾	14 /14⅛
No. 3 Amber, spot..	8⅝	11 /11⅛	11⅜/11½
No. 1 Brown.....	8½	11 /11¼	11½
Brown rolled	6¾	10⅛/10⅜	10½/10⅝
Paras			
Upriver fine......	10	9⅛	9¼
Upriver fine......	*13¼	*12¾	*12¾
Upriver coarse ...	6	7	7⅛
Upriver coarse ...	*10½	*11	*11
Islands fine	....	8¾	8⅞
Islands fine	*12¾	*12¾	*12¾
Acre, Bolivian fine	10¼	9¼	9⅜
Acre, Bolivian fine	*13½	*13	*13
Beni, Bolivian ...	10	9¾	9⅞
Madeira fine	10¼	9⅛	9¼
Caucho			
Upper Ball	6	7	7⅛
Upper ball	*10½	*11	*11
Lower ball	5	6¾	6⅞
Pontianak			
Bandjermasin	..	6½	6
Pressed block ...	..	11	10½
Sarawak	..	6½	6
Manicobas			
Manicoba, 30% guar.	6	..	..
Mangabiera, thin sheet	6	..	..
Guayule			
Duro, washed and dried	12	12	12
Ampar	13	13	13
Africans			
Rio Nuñez	12	12	12
Black Kassai	10	10	10
Prime Niger flake.	18	25	25
Gutta Percha			
Gutta Siak	10½	9¾	9¾
Gutta Soh	15	14½	14
Red Macassar ...	1.50	1.40	1.25
Balata			
Block, Ciudad Bolivar	40	36	34
Manaos block ...	32	32	28
Surinam sheets ..	42	40	42
Amber	47	43	45

*Washed and dried crepe. Shipments from Brazil. †Nominal.

Rims Approved by the Tire & Rim Association, Inc.

Rim Size	January, 1935 No.	%	January, 1934 No.	%
Low Pressure (1933)				
15x5.50E	......	...	444	0.1
16x4.00D	262,647	14.1	107,052	13.5
16x4.25D	173,799	9.3	83,987	10.6
16x4.50D	73,984	3.9	32,939	4.2
16x5.00E	4,469	0.2	7,036	0.9
16x5.50E	240	0.0	4,999	0.6
(1934)				
15x5.50F	33	0.0	......	...
16x4.00E	328,141	17.5	7,356	0.9
16x4.50E	232,827	12.4	53,433	6.8
16x5.00F	18,608	1.0	28,731	3.6
Drop Center				
17x3.00D	208,789	11.2	24,868	3.1
17x3.25E	72,621	3.9	28,404	3.6
17x3.62F	87,620	4.7	153,349	19.4
17x4.00F	11,354	0.6	3,408	0.4
17x4.19F	1,933	0.1	2,263	0.3
18x2.15B	.....	...	4,490	0.6
18x3.00D	.....	...	406	0.1
18x3.25E	364	0.0	5,124	0.7
18x4.00F	21	0.0	.....	...
18x4.19F	770	0.0	610	0.1
19x2.15B	.....	...	2,097	0.3
19x3.00D	.....	...	6,732	0.8
19x3.25E	428	0.0	.....	...
20x3.25	2,807	0.2	.....	...
21x3.25E	.....	...	458	0.1
Flat Base Balloon				
17x5	2,199	0.1	.....	...
17x6	799	0.0	.....	...
18x4	.....	...	848	0.1
18x5	324	0.0	.....	...
19x2.75D	1,260	0.1	.....	...
19x3.00D	646	0.0	.....	...
19x4½	193	0.0	.....	...
19x5	.....	...	392	0.0
20x2.75D	124	0.0	4,464	0.6
20x3½	2,098	0.1	.....	...
20x4	121	0.0	280	0.0
20x4½	.....	...	439	0.1
20x5	2,748	0.1	10,398	1.3
20x6	107	0.0	919	0.1
21x2.75D	226	0.0	.....	...
21x3½	1,614	0.1	1,933	0.3
21x4	321	0.0	.....	...
21x4½	1,457	0.1	.....	...
21x6	.....	...	358	0.0
High Pressure				
30x3½	228	0.0	.....	...
18" Truck				
18x6	.....	...	10	0.0
18x7	4,607	0.2	405	0.1
18x8	9	0.0	.....	...
20" Truck				
20x5	199,356	10.7	129,366	16.4
20x6	138,446	7.4	48,513	6.1
20x7	10,736	0.6	18,322	2.3
20x8	10,572	0.6	7,211	0.9
20x9/10	820	0.0	764	0.1
20x11	84	0.0	70	0.0
22" Truck				
22x8	1,750	0.1	711	0.1
22x9/10	567	0.0	277	0.0
24" Truck				
24x5	.....	...	10	0.0
24x6	659	0.0	.....	...
24x7	208	0.0	1,788	0.2
24x8	1,764	0.1	1,846	0.2
24x9/10	329	0.0	805	0.1
24x11	15	0.0	193	0.0
Tractor Rims				
24x6.00S	.....	...	122	0.0
24x8.00T	81	0.0	450	0.1
28x8.00T	359	0.0	.....	...
36x6.00S	2,302	0.1	194	0.0
36x8.00T	165	0.0	.....	...
Airplane				
44x10	10	0.0	.....	...
Totals	1,868,759	...	789,274	...

New York Outside Market—Spot Closing Rubber Prices—Cents per Pound

	Jan. 1935 28	29	30	31	Feb. 1935 1	2	4	5	6	7	8	9	11	12*	13	14	15	16	18	19	20	21	22*	23
No. 1 Ribbed Smoked Sheet	12½	12⅜	12⅝	12⅝	12⅝	12⅝	12⅝	12 11/16	12⅝	12¾	13 1/16	13⅛	13	..	13	13 1/16	13	12⅞	13⅜	13 1/16	13 1/16	13 1/16	..	13 1/16
No. 2 Ribbed Smoked Sheet	11¾	11⅝	11⅞	11⅞	12	12	12	12	11 15/16	12	12⅜	12½	12⅜	..	12⅜	12 7/16	12⅜	12¼	12⅝	12⅜	12⅜	12⅜	..	12⅜
No. 3 Ribbed Smoked Sheet	11⅝	11½	11⅝	11¾	11⅞	11⅞	11⅞	11⅞	11 13/16	11⅞	12⅛	12¼	12⅛	..	12⅛	12 3/16	12⅛	12⅛	12 7/16	12⅛	12 3/16	12 3/16	..	12 3/16
No. 4 Ribbed Smoked Sheet	11½	11⅜	11½	11⅝	11¾	11¾	11¾	11¾	11 11/16	11¾	12	12⅛	12	..	12	12 1/16	12	12	12 5/16	12	12 1/16	12 1/16	..	12 1/16
No. 1 Thin Latex Crepe...	12⅞	12¾	12 15/16	13	13	13	13	13⅛	13	13 1/16	13¼	13½	13⅜	..	13⅜	13 7/16	13⅜	13¼	13¾	13 7/16	13 7/16	13 7/16	..	13 7/16
No. 1 Thick Latex Crepe..	12¾	12⅝	12¾	12⅞	12⅞	12⅞	12⅞	13	12⅞	12 15/16	13⅛	13⅜	13¼	..	13¼	13 5/16	13¼	13⅛	13⅝	13 5/16	13 5/16	13 5/16	..	13 5/16
No. 1 Brown Crepe.......	10⅞	10 11/16	10¾	10⅞	10 15/16	10 15/16	10 15/16	11	10 15/16	11	11 5/16	11⅜	11¼	..	11¼	11 5/16	11¼	11 3/16	11½	11¼	11 7/16	11 7/16	..	11 7/16
No. 2 Brown Crepe.......	10⅝	10 7/16	10½	10⅝	10 11/16	10 11/16	10 11/16	10¾	10 11/16	10¾	11 1/16	11⅛	11	..	11	11 1/16	11	10 15/16	11¼	11	11 3/16	11 3/16	..	11 3/16
No. 2 Amber............	10⅞	10 11/16	10 13/16	10⅞	11	11	11	11 1/16	11	11 1/16	11⅜	11⅜	11¼	..	11¼	11⅜	11 5/16	11¼	11½	11 5/16	11½	11½	..	11½
No. 3 Amber............	10⅝	10 7/16	10 9/16	10⅝	10¾	10¾	10¾	10 13/16	10¾	10 13/16	11⅛	11⅛	11	..	11	11⅛	11 1/16	11	11 5/16	11 1/16	11¼	11¼	..	11¼
No. 4 Amber............	10⅜	10⅛	10¼	10⅜	10⅜	10⅜	10⅜	10½	10⅜	10 7/16	10⅝	10¾	10⅝	..	10⅝	10⅝	10⅝	10 9/16	10⅞	10⅝	10¾	10¾	..	10¾
Rolled Brown...........	10	10	10	10⅛	10⅛	10⅛	10⅛	10¼	10¼	10 5/16	10½	10⅝	10½	..	10½	10½	10½	10 7/16	10¾	10½	10⅝	10⅝	..	10⅝

* Holiday.

COMPOUNDING INGREDIENTS

THE revival of manufacturing activity in the rubber industry since the turn of the year, notably in tires, tubes, automotive rubbers, battery boxes, and general mechanicals, has resulted in good business for supplies of rubber chemicals and compounding materials generally.

ACCELERATORS AND ANTIOXIDANTS. These vitally essential materials are moving into consuming channels in increasing volume.

A new all-purpose accelerator of special merit, called Zenite, appears this month in the market. It is offered in three modifications severally adapted for rubber stocks of different types.

CARBON BLACK. The market is very stable, and aside from the possibilities in Texas where considerable agitation appears over the great waste of natural gas by the gasoline shipping plants there seems no reason to anticipate changes of any consequence. Rubber schedules are quite heavy at present, and reliable estimates for the first quarter show a very substantial increase comparing favorably with the best periods heretofore.

FACTICE. The market situation holds practically unchanged. There is a steady demand for rubber substitutes and factice, but if the prices of crude materials continue to advance, higher prices may be looked for shortly.

RUBBER COLORS. The market is very strong with upward tendency. Some raw materials are scarce, preventing immediate deliveries. Consumers are advised to carry extra stocks in view of possible delay of supplies.

SOLVENTS. The active demand noted earlier continues to be well maintained. Prices hold firm.

TITANIUM PIGMENTS. There is a brisk upward turn in the demand for these goods, particularly with manufacturers of footwear and bathing novelties. No change in prices has occurred, and none is anticipated despite the reduction in zinc oxide prices. Contract returns for the first six months of this year are in excess of those for the last six months of 1934, and withdrawals against contracts are brisk at present.

ZINC OXIDE. The rubber demand for zinc oxide is very promising. Early in February prices for lead free, and 5 and 10% leaded grades were reduced ¾¢ a pound, and 35% leaded reduced ½¢ a pound. Contracts are being booked at these prices up to June 30. The demand from tire makers is improving.

New York Quotations

February 23, 1935

Prices Not Reported Will Be Supplied on Application

Abrasives

Pumicestone, powdered	lb.	$0.01¾/$0.03½
Rottenstone, domestic	lb.	.02½/ .05
English	ton	
Silica, 15	ton	
Tripoli	lb.	.02¼/ .03

Accelerators, Inorganic

Lime, hydrated	ton	20.00
Litharge (commercial)	lb.	.06 / .06¼
Magnesia, calcined, heavy	lb.	.04
carbonate	lb.	.06½/ .07

Accelerators, Organic

A-1	lb.	.21 / .25
A-5-10	lb.	.33 / .36
A-10	lb.	
A-11	lb.	.60 / .75
A-16	lb.	.55 / .65
A-19	lb.	.56 / .75
A-32	lb.	.70 / .80
A-77	lb.	
Accelerator 49	lb.	.40 / .51
87	lb.	
122	lb.	
552	lb.	
808	lb.	
833	lb.	
Acrin	lb.	
Aldehyde ammonia	lb.	
Altax	lb.	
Beutene	lb.	
Butyl Zimate	lb.	
C-P-B	lb.	
Captax	lb.	
Crylene	lb.	
Paste	lb.	
D-B-A	lb.	
Di-Esterex	lb.	
Di-Esterex-N	lb.	
DOTG	lb.	.44 / .56
D.O.T.T.U.	lb.	
DPG	lb.	.35 / .46
Esterex	lb.	
Ethylideneaniline	lb.	
Formaldehyde P.A.C.	lb.	
Formaldehydeaniline	lb.	
Formaldehyde-para-toluidine	lb.	
Guantal	lb.	.42 / .51
Hepteen	lb.	
Base	lb.	
Hexamethylenetetramine	lb.	
Lead oleate, No. 999	lb.	.10
Witco	lb.	.11
Methylenedianilide	lb.	
Monex	lb.	
Novex	lb.	
Pipsolene	lb.	
R-2	lb.	1.50 / 1.90
Base	lb.	4.55 / 5.00
R & H 50-D	lb.	
Safex	lb.	
Super-sulphur No. 1	lb.	
No. 2	lb.	
Tepidone	lb.	
Tetrone A	lb.	
Thio	lb.	
Thiocarbanilide	lb.	
Thionex	lb.	
Trimene	lb.	
Base	lb.	
Triphenyl guanidine (TPG)	lb.	
Tuads	lb.	
Ureka	lb.	$0.62 /$1.00
Blend B	lb.	
C	lb.	.58 / .69
Vulcanex	lb.	
Vulcanol	lb.	
Vulcone	lb.	
Z-B-X	lb.	
Z-88-P	lb.	.48 / .60
Zenite	lb.	
A	lb.	
B	lb.	
Zimate	lb.	

Acids

Acetic 28% (bbls.)	100 lbs.	2.40 / 2.65
glacial (carboys)	100 lbs.	14.00
Sulphuric, 66°	ton	15.50

Activator

Barak	lb.	

Age Resisters

Age-Rite Gel	lb.	
HP	lb.	
powder	lb.	
resin	lb.	
white	lb.	
Akroflex A	lb.	
B	lb.	
C	lb.	
Albasan	lb.	
Antox	lb	
A-V-A-R	lb.	
B-L-E	lb.	
Flectol B	lb.	
H	lb	
White	lb.	
M-U-F	lb.	
Neozone (standard)	lb.	
A	lb.	
C	lb.	
D	lb.	
E	lb.	
Oxynone	lb.	
Parazone	lb.	
Permalux	lb.	
Solux	lb.	
V-G-B	lb.	

Alkalies

Caustic soda, flake, Columbia (drums)	100 lbs.	3.25 / 4.25
liquid, 50%	100 lbs.	2.25
solid (drums)	100 lbs.	2.85 / 4.30

Antiscorch Materials

Antiscorch T	lb.	
Retarder B	lb.	
W	lb.	
R. H. Cumar	lb.	.085
U-T-B	lb.	

Antisun Materials

Heliozone	lb.	
Sunproof	lb.	

Binders, Fibrous

Asbestos	ton	$30.00

Brake Lining Saturants

B. R. C. No. 553	lb.	.015 /$0.017
B. R. T. No. 3	lb.	.015 / .017

Colors

BLACK		
Bone (Quality Group No. 1)	lb.	.11½/ .12
Lampblack (commercial)	lb.	.07 / .15
BLUE		
Brilliant	lb.	
Prussian	lb.	.36½
Toners	lb.	.80 / 3.50
Ultramarine, dry	lb.	.10
BROWN		
Mapico	lb.	.13
Sienna, Italian, raw (Quality Group No. 1)	lb.	.12½
GREEN		
Brilliant	lb.	
Chrome, light	lb.	.20
medium	lb.	.20
oxide (delivered)	lb.	.21½
Dark	lb.	
Guignet's	lb.	.70
Light	lb.	
Toners	lb.	.85 / 3.50
ORANGE		
Lake	lb.	
Toners	lb.	.40 / 1.60
ORCHID		
Toners	lb.	1.50 / 2.00
PINK		
Toners	lb.	1.50 / 4.00
PURPLE		
Permanent	lb.	
Toners	lb.	.60 / 2.00
RED		
Antimony		
Crimson, R. M. P. No. 3	lb.	.46
Sulphur free	lb.	.48 / .60
Golden 15/17%	lb.	.25 / .30
7-A	lb.	.35
Z-2	lb.	.20
Cadmium	lb.	.75 / .80
Chinese	lb.	
Crimson	lb.	
Iron Oxides		
Rub-Er-Red	lb.	.09¼
Mapico	lb.	.09¼
Medium	lb.	
Scarlet	lb.	
Toners	lb.	.80 / 2.00
WHITE		
Lithopone (bags)	lb.	.04½/ .04¾
Albalith Black Label-11	lb.	.04½/ .04¾
Astrolith (5-ton lots)	lb.	.04½/ .04¾

Azolith ... lb. $0.04½/$0.04¾
Cryptone-19 ... lb. .06 / .06¾
CB-21 ... lb. .06 / .06¾
Sunolith (5-ton lots) ... lb. .04½/ .04¾
XX-20 Zinc Sulphide ... lb. .10½/ .10¾
86 ... lb. .10½/ .10¾
Rayox ... lb.
Titanolith (5-ton lots) ... lb. .06 / .06¼
Titanox-A ... lb. .17 / .18¾
B ... lb. .06 / .06½
C ... lb. .06 / .06½
Ti-Tone ... lb.
Zinc Oxide
Azo ZZZ-11 ... lb. .05¾/ .06
44 ... lb. .05¾/ .06
55 ... lb. .05¾/ .06
66 ... lb. .05¾/ .06
F. P. Florence, Green Seal-8 ... lb. .09⅜/ .09⅝
Red Seal-9 ... lb. .08⅜/ .08⅝
White Seal-7 (bbls.) ... lb. .10⅝
Green Seal No. 333, Anaconda ... lb. .09⅜/ .09⅝
Horsehead (lead free) brand
Special-3 ... lb. .05¾/ .06
XX Red-4 ... lb. .05¾/ .06
72 ... lb. .05¾/ .06
78 ... lb. .05¾/ .06
103 ... lb. .05¾/ .06
Kadox Black Label-15 ... lb. .09⅜/ .09⅝
Blue Label-16 ... lb. .08⅜/ .08⅝
Red Label-17 ... lb. .07 / .07¼
Lead Free No. 352, Anaconda ... lb. .05¾/ .06
No. 570 ... lb. .05¾/ .06
No. 577 ... lb. .05¾/ .06
Red Seal No. 222, Anaconda ... lb. .08⅜/ .08⅝
St. Joe (lead free)
Black Label No. 20 (bags) ... lb. .05¾
Green Label No. 42 (bags) ... lb. .05¾
Red Label No. 30 (bags) ... lb. .05¾
U.S.P. No. 777, Anaconda (bbls.) ... lb. .12¾
U.S.P. X (bbls.) ... lb. .12½
White Seal No. 555, Anaconda ... lb. .10⅝

YELLOW
Cadmium ... lb. .40 / .45
Lemon ... lb.
Mapico ... lb. .09½
Ocher, domestic (Quality Group A) ... lb. .02¾
Toners ... lb. 2.50

Dispersing Agents
Bardex ... lb. .023 / .025
Bardol ... lb. .021 / .023
Darvan ... lb.

Factice—See Rubber Substitutes

Fillers, Inert
Asbestine, c.l., f.o.b. mills ... ton 15.00
Barytes ... ton 30.00
f.o.b. St. Louis ... ton 23.00
off color, domestic ... ton 22.50 /25.00
white, imported ... ton 32.50 /35.00
Blanc fixe, dry precip. ... ton 70.00 /75.00
pulp ... ton 42.50
Calcene ... ton 35.00 /45.00
Infusorial earth ... lb. .02 / .05
Kalite No. 1 ... ton
No. 3 ... ton
Suprex, white, extra light ... ton
heavy ... ton 45.00 /60.00
Whiting
Chalk precipitated ... lb. .04½/ .04¾
Columbia brand ... ton 9.00 /14.00
Domestic ... 100 lbs.
Hakuenka ... lb.
Paris white, English cliffstone ... 100 lbs.
Southwark Brand, Commercial ... 100 lbs.
All other grades ... 100 lbs.
Sussex ... ton
Witco, c.l. ... ton 7.00
Wood flour (f.o.b. New Hampshire) ... ton

Fillers for Pliability
Flex ... lb.
Fumonex, c.l., f.o.b works, bags ... lb. .03
l.c.l., f.o.b. warehouse ... lb. .05½/ .07
P-33 ... lb.
Thermax ... lb.
Velvetex ... lb.

Finishes
IVCO lacquer, clear ... gal.
colors ... gal.
Rubber lacquer, clear ... gal.
colored ... gal.
No. 106 ... gal. 3.00
Starch, corn, pwd. ... 100 lbs. 3.56 / 3.76
potato ... lb. .05¾/ .06
Talc, dusting ... ton 20.00
Pyrax ... ton

Flock
Cotton flock, dark ... lb. .10½/ .11½
dyed ... lb. .50 / .80
white ... lb. .14 / .20
Rayon flock, colored ... lb. 1.25 / 1.75
white ... lb. 1.10 / 1.20

Latex Compounding Ingredients
Antox, dispersed ... lb.
Aquarex D ... lb.
F ... lb.
Aresco ... lb. $0.28 /$0.40
Aresklene ... lb.
Casein, domestic (5-ton lots, delivered) ... lb. .11½/ .12
Catalpo ... ton
Color pastes, dispersed ... lb.
Dispersaid ... lb. 1.50
Emo, brown ... lb. .12
white ... lb. .12
Factice Compound, dispersed ... lb. .36
Heliozone, dispersed ... lb.
Igepon A ... lb.
Nekal BX (dry) ... lb.
Palmol ... lb. .09
Sulphur, colloidal ... lb.
Vulcan colors ... lb.
Zinc oxide, colloidal ... lb.

Mineral Rubber
B. R. C. No. 20 ... lb. .0125/ .014
Black Diamond, c.l. ... ton 25.00
Genasco Hydrocarbon, granulated, (fact'y) ... ton 30.00
solid ... ton 25.00
Gilsonite Hydrocarbon (factory) ... ton
Hydrocarbon, hard ... ton
soft ... ton
Parmr Grade 1 ... ton 25.00 /28.00
Grade 2 ... ton 25.00 /28.00
265° ... ton

Mold Lubricants
Mold Paste No. 1 ... lb.
Rusco mold paste ... lb. .12 / .30
Sericite ... ton 65.00 /70.00
Soapbark (cut) ... lb. .11 / .12
Soapstone ... ton 15.00 /25.00

Oils
Castor, blown, c.l., drums, returnable ... lb. .11½
Cottonseed oil fatty acids ... lb. .0690
Poppyseed (bbls.) ... gal.
Rapeseed, refined (bbls.) ... gal. .49

Reclaiming Oils
B. R. V. ... lb. .039 / .041
S. R. O. ... lb. .012 / .014

Reenforcers
Carbon Black
Aerfloted Arrow Specification Black ... lb. .0535/ .0825
Arrow Compact Black ... lb.
Granulized Carbon Black ... lb.
Century (delivered) ... lb. .0445/ .0535
"Certified" Cabot ... lb.
Spheron ... lb.
Disperso (delivered) ... lb. .0445/ .0535
Dixie, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. ... lb. .0445
c.l., delivered New York ... lb. .0535
local stock, delivered ... lb. .07 / .08¼
Dixiedensed, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. ... lb. .0445
c.l., delivered New York ... lb. .0535
local stock, delivered ... lb. .07 / .08¼
Excello, c.l., f.o.b. Gulf ports ... lb. .0445
delivered New York ... lb. .0535
l.c.l., delivered New York ... lb. .07 / .08¼
Gastex ... lb. .03 / .07
Kosmobile, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. ... lb. .0445
c.l., delivered New York ... lb. .0535
local stock, delivered ... lb. .07 / .08¼
Kosmos, c.l., f.o.b. New Orleans, La., Galveston or Houston, Tex. ... lb. .0445
c.l., delivered New York ... lb. .0535
local stock, delivered ... lb. .07 / .08¼
Micronex Beads ... lb.
Mark II ... lb.
Standard ... lb.
W-5 ... lb.
W-5 ... lb.
Ordinary (compressed or uncompressed) ... lb. .0535
Supreme, c.l., f.o.b Gulf ports ... lb. .0445
delivered New York ... lb. .0535
l.c.l., delivered New York ... lb. .07 / .08¼
Carbonex ... lb. .030 / .0375
Carbonex "S" ... lb. .0315/ .040
Clays
Aerfloted Paragon ... ton 8.50
Suprex No. 1 Selected ... ton 10.00
No. 2 Standard ... ton 8.50
Blue Ridge, dark ... ton
China ... ton
Dixie ... ton
Junior ... ton
McNamee ... ton
Par ... ton
Perfection ... ton
Standard ... ton
Witco ... ton $8.50
Cumar EX ... lb. .04

Reodorants
Amora A ... lb.
B ... lb.
C ... lb.
D ... lb.
Para-Dors ... lb.
Rodo No. 0 ... lb.
No. 10 ... lb.

Rubber Substitutes or Factice
Amberex ... lb. .13¾
Black ... lb. .06½/$0.09
Brown ... lb. .08 / .11
Duphax A ... lb. .095
B ... lb. .095
Fac-Cel B ... lb. .12
C ... lb. .12
White ... lb. .08½/ .12

Softeners
B. R. C. No. 555 ... lb. .012 / .014
B. R. T. No. 7 ... lb. .015 / .017
Burgundy pitch ... lb. .04 / .05
(net weight) ... lb. .07 / .08½
Corn oil, crude (bbls.) ... lb. .11⅝
Cycline oil ... gal. .15 / .28
Fluxol ... ton
Genasco liquid asphalt ... gal. .07
Hardwood pitch, c.l. ... ton 23.50 /25.00
Palm oil ... lb. .08
(Witco) ... lb. .06
Petrolatum, light amber ... lb. .03¾
Pigmentar (drums) ... gal. .25 / .27
Pigmentaroil (drums) ... gal. .25 / .27
Pine oil, dest. distilled (drums) ... gal. .44 / .48
pitch ... bbl. 6.00
tar (drums) ... gal. .25 / .27
retort ... gal. .33
Plastogen ... lb.
Reogen ... lb.
Rosin oil, compounded ... gal. .37 / .41
Rubtack ... lb. .10
Seedine ... lb. .06¾
Tackol ... lb. .085 / .18
Tonox ... lb.
Powder ... lb.
Witco No. 20 ... gal. .15
Woburn No. 8 oil ... lb. .05½

Softeners for Hard Rubber Compounding
RSL Resin ... lb.
Resin C-55° ... lb. .0125/ .0145
Resin C-70° ... lb. .0125/ .0145
Resin C-85° ... lb. .0125/ .0145

Solvents
Benzol 90% (drums) ... gal. .25
Beta-Trichlorethane ... gal.
Bondogen ... gal.
Carbon bisulphide (drums) ... lb. .05¾/ .08½
tetrachloride ... lb. .05¼
Dipentene, commercial (drums) ... gal. .42 / .44
Rubber (f.o.b. Group 3 refineries) ... gal.
Solvesso No. 1, tank cars ... gal. .17½
No. 2 ... gal. .22½
No. 3 ... gal. .17½
No. 4 ... gal. .22½
Toluol ... gal. .38
Turpentine, steam distilled ... gal. .53
wood, dest. distilled (drums) ... gal. .41 / .43

Stabilizers for Cure
Cocoanut oil F. A. (Lauric Acid) ... lb. .09½
Laurex, ton lots ... lb.
Stearex B ... lb. .10½/ .12
Beads ... lb. .08 / .09
Stearic acid, dbl. pres'd ... lb. .12 / .15
single pressed ... lb. .10½/ .12
Stearite ... lb. .08
Zinc stearate ... lb. .20 / .21

Synthetic Rubber
DuPrene Latex Type 50 ... gal.
Type D ... lb.

Tackifier
B. R. H. No. 2 ... lb. .015 / .017

Varnish
Shoe ... gal. 1.75

Vulcanizing Ingredients
Sulphur
Chloride, drums ... lb. .03½/ .04
Flowers, extrafine refined, U.S.P. ... 100 lbs.
Rubber ... 100 lbs. 1.95 / 2.70
Telloy ... lb.
Vandex ... lb.
(See also Colors—Antimony)

Waxes
Carnauba, No. 3 chalky ... lb. .23 / .23½
2 N.C. ... lb. .27 / .28
3 N.C. ... lb. .24 / .24½
1 Yellow ... lb. .34½/ .35
2 ... lb. .33½/ .34
Montan, crude ... lb. .11 / .11½
Paraffine (128/130) refined ... lb. .06⅛

Tire Production Statistics

	Pneumatic Casings—All Types		
	In-ventory	Produc-tion	Total Shipments
1932	6,115,487	32,067,732	32,200,820
1933	7,110,456	36,243,384	35,274,970
1934			
Jan.	9,393,857	3,803,939	3,125,726
Feb.	10,403,282	4,205,039	3,186,363
Mar.	11,301,142	5,024,718	4,096,273
Apr.	11,621,310	4,626,881	4,305,227
May	10,792,770	4,322,536	5,171,748
June	9,912,780	4,211,905	5,071,403
July	9,153,712	3,252,251	4,032,689
Aug.	8,436,236	3,426,652	4,179,022
Sept.	8,166,339	2,847,879	3,087,416
Oct.	8,397,095	3,188,295	2,919,423
Nov.	8,515,619	3,240,603	3,095,369
Dec.	9,171,335	3,665,065	3,015,295
	Solid and Cushion Tires		
1932	23,830	97,089	108,581
1933	.....	130,987	126,990
1934			
Jan.	29,971	13,792	13,946
Feb.	....	12,440	12,797
Mar.	28,280	15,017	15,273
Apr.	......	16,217	13,701
May	......	18,639	17,551
June	......	21,385	19,487
July	......	18,283	17,807
Aug.	......	17,864	16,283
Sept.	......	14,676	13,275
Oct.	......	16,594	15,261
Nov.	......	16,231	16,806
Dec.	......	16,359	14,965
	Inner Tubes—All Types		
1932	5,399,551	29,513,246	30,328,536
1933	6,251,941	34,044,689	33,112,472
1934			
Jan.	8,150,708	3,444,574	3,102,931
Feb.	8,892,154	3,956,082	3,223,591
Mar.	9,936,574	5,038,649	3,994,683
Apr.	10,267,331	4,593,370	4,212,020
May	9,741,304	4,228,239	4,754,683
June	8,531,574	3,974,408	5,149,951
July	7,811,828	3,425,352	4,193,210
Aug.	7,328,404	3,569,626	4,072,352
Sept.	7,409,888	3,016,845	2,933,743
Oct.	7,906,614	3,122,579	2,608,593
Nov.	8,247,408	3,073,596	2,683,521
Dec.	8,904,496	3,397,651	2,764,852

	Cotton and Rubber Consumption Casings, Tubes, Solid and Cushion Tires		Consumption of Motor Gasoline (100%)
	Cotton Fabric Pounds	Crude Rubber Pounds	Gallons
1932	128,981,222	416,577,533	15,703,800,000
1933	148,989,293	512,489,423	15,880,746,000
1934			
Jan.	16,437,210	59,957,163	1,239,798,000
Feb.	18,720,923	63,400,171	1,047,816,000
Mar.	20,927,389	75,636,859	1,298,472,000
Apr.	19,371,041	69,930,591	1,374,870,000
May	18,785,428	67,636,897	1,601,922,000
June	17,715,577	61,849,622	1,524,432,000
July	13,267,392	49,352,977	1,583,190,000
Aug.	13,724,148	50,419,339	1,635,186,000
Sept.	12,942,100	44,496,192	1,469,328,000
Oct.	13,169,132	45,894,989	1,576,848,000
Nov.	15,382,268	52,565,247	1,463,238,000
Dec.	15,626,887	56,307,715	1,281,714,000

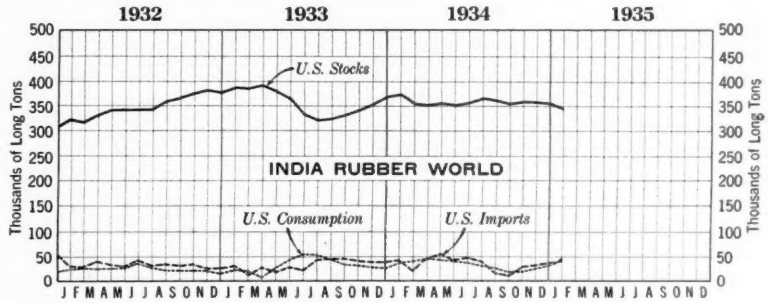
Rubber Manufacturers Association, Inc., figures representing approximately 97% of the industry for 1934 and 80% for previous years, with the exception of gasoline consumption.

United States Latex Imports

Year	Pounds	Value
1931	10,414,712	$884,355
1932	11,388,156	601,999
1933	24,829,861	1,833,671
1934		
Jan.	2,521,961	$239,054
Feb.	1,983,210	193,732
Mar.	2,539,425	257,545
Apr.	2,988,131	321,390
May	3,151,740	368,642
June	3,266,318	421,317
July	2,757,167	385,733
Aug.	2,617,829	369,335
Sept.	2,097,385	312,967
Oct.	2,065,490	282,503
Nov.	1,986,245	296,447
Dec.	1,301,233	184,588

Data from United States Department of Commerce, Washington, D. C.

IMPORTS, CONSUMPTION, AND STOCKS



United States Stocks, Imports, and Consumption

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks

Twelve Months	U. S. Net Imports* Tons	U. S. Con-sumption Tons	U. S. Stocks on Hand† Tons	U. S. Stocks Afloat† Tons	United King-dom Stocks†‡ Tons	Singapore and Penang, Etc., Stocks†‡ Tons	World Pro-duction (Net Exports)‡ Tons	World Con-sumption Esti-mated‡ Tons	World Stocks†‡§ Tons
1931	495,163	348,986	322,825	40,455	127,103	55,458	797,441	668,660	495,724
1932	400,787	332,000	379,000	38,360	92,567	36,802	709,840	670,250	518,187
1933	411,615	401,000	365,000	55,606	86,438	48,744	845,291	818,370	489,029
1934									
January	46,204	39,284	370,979	45,768	90,272	51,427	81,487	77,200	510,359
February	31,032	40,609	357,094	53,063	92,482	52,580	88,239	82,100	502,155
March	44,605	47,097	353,242	54,722	94,314	59,224	92,070	78,000	506,494
April	45,662	44,947	351,981	56,251	96,108	63,381	84,153	88,400	508,795
May	47,954	43,012	351,329	57,921	96,197	89,758	115,612	79,300	537,278
June	49,683	40,241	358,149	46,698	99,702	82,333	70,250	75,000	542,958
July	41,530	32,647	364,883	45,869	105,904	76,417	73,279	69,100	547,204
August	33,248	33,310	362,647	40,278	105,199	77,100	75,093	79,500	544,944
September	28,835	30,352	359,667	38,831	112,951	69,824	88,894	81,200	542,340
October	35,298	31,347	362,018	38,247	120,897	69,587	68,938	68,800	552,502
November	36,233	34,842	361,236	38,625	127,762	62,966	76,592	75,400	551,964
December	29,200	36,662	352,632	47,644	134,790	67,899	92,082	73,000	555,321
1935									
January	42,059	47,103	346,084	42,066	......	......	......	......	....

*Including liquid latex, but not guayule. †Stocks on hand the last of the month or year. ‡W. H. Rickinson & Son's figures. §Stocks at the 3 main centers, U. S. A., U. K., Singapore and Penang.

CRUDE rubber consumption by United States manufacturers for January amounted to 47,103 long tons, compared with 36,662 long tons for December, an increase of 28.5% over December and 19.9% over January, 1934, according to R. M. A. statistics. Consumption for January, 1934, was reported to be 39,284 long tons.

Crude rubber imports for January were 42,059 long tons, an increase of 44.0% above the December figure of 29,200 long tons, but 9.0% below the 46,204 long tons imported in January, 1934.

The estimated total domestic stocks of crude rubber on hand January 31 were 346,084 long tons, which compares with December 31, 1934, stocks of 352,632 long tons and 370,979 long tons on hand January 31, 1934.

Crude rubber afloat for the United States ports on January 31 was 42,066 long tons compared with 47,644 long tons afloat on December 31, 1934, and 45,768 long tons, January 31, 1934.

London and Liverpool Stocks

Week Ended	London Tons	Liverpool Tons
Feb. 2	82,160	66,429
Feb. 9	83,622	67,043
Feb. 16	85,202	67,846
Feb. 23	87,222	68,243

British Malaya

An official cable from Singapore to the Malayan Information Agency, Malayan House, 57 Charing Cross, London, S.W.1, England, gives the following figures for January, 1935:

Rubber Exports: Ocean shipments from Singapore, Penang, Malacca, and Port Swettenham

To	January, 1935: Sheet and Crepe Rubber Tons	Latex, Concentrated Latex, Revertex, and Other Forms of Latex Tons
United Kingdom	12,931	259
United States	29,232	474
Continent of Europe	7,779	251
British possessions	802	45
Japan	4,331	11
Other countries	602	3
Totals	55,677	1,043

Rubber Imports: Actual, by Land and Sea

From	Dry Rubber Tons	Wet Rubber Tons
Sumatra	1,748	4,649
Dutch Borneo	1,977	1,065
Java and other Dutch Islands	221	2
Sarawak	1,512	118
British Borneo	543	19
Burma	256	17
Siam	1,639	975
French Indo-China	193	109
Other countries	92	7
Totals	8,181	6,961

COTTON AND FABRICS

New York Cotton Exchange Week-End Closing Prices

Futures	Dec. 29	Feb. 2	Feb. 9	Feb. 16	Feb. 23
Jan.	12.71	.....	.....	.....	.....
Feb.	12.59	12.16	12.34	12.38	.....
Mar.	12.64	12.22	12.38	12.42	12.30
May	12.74	12.28	12.45	12.48	12.40
July	12.79	12.30	12.44	12.52	12.46
Sept.	12.75	12.22	12.38	12.44	12.42
Oct.	12.69	12.20	12.36	12.41	12.41
Nov.	12.64	12.23	12.38	12.43	12.43
Dec.	12.67	12.27	12.41	12.46	12.47
Jan.	.....	12.28	12.43	12.50	12.50

THE above table gives the nearest first and last week-end closing prices of the month previous to that under review, also the week-end closing prices of each week of this review. This plan permits tracing at a glance the prices of each future for approximately 2 consecutive months.

Week ended February 2. Gold clause decisions, upset conditions in foreign exchange markets, and foreign selling here caused this period to begin with lower prices and apprehensive trading. This condition prevailed until the last day, both trading and price movements being weak. Saturday, however, prices broke sharply because of a surge of selling by foreign interests that were detrimentally affected by the unsettled pepper pool collapse abroad. Hearings before the Senate Agriculture Committee on dwindling cotton exports held the attention of traders although nothing of tangible importance occurred.

Week ended February 9. Relatively dull and nervous conditions marked this week's market sessions. Prices seesawed through fairly narrow ranges because of the absence of interest except speculative, and little of that, but gradually trended upward to gains of 14 to 18 points over the previous week's close. The principal developments of the week seemed to reside in the facts: that the question of whether or not the Government should continue its loan policy for the 1935 crop was being debated in Washington; that F. L. Lordon, of Houston, addressed the Senate Agriculture Committee stating that 100,000 employes faced unemployment because of loss of cotton exports and that 125,000 Texas tenants had already been forced off farms because of reduced acreage; and that Liverpool is getting impatient with the cotton policy here as evidenced by 85% of the members of the Liverpool Cotton Exchange voting to create a new futures contract against which various growths of cotton may be tendered as a substitute for the one now in existence, which requires the tender of American staple.

Week ended February 16. This week of light and disinterested trading started with losses of 4 to 7 points and finished with similar gains as against the previous week's close. Disappointment due to the Supreme Court not rendering its gold decision Monday or, as was expected in some quarters, on the holiday, Tuesday, seemed to assure little market activity until the decision would finally be given. News was of a nature as inconsequential as the market activity. Nothing of importance came from the Agriculture Committee conferences that were held in Washington.

Week ended February 23. In marked contrast to the narrow price fluctuations of February 16 and the recent inactivity of the cotton market, prices jumped Monday to close 17 to 19 points higher than the previous close in the most active trading of the past many weeks. The Supreme Court decision favorable to the Government policy seemed to stimulate buying from all quarters. This gave way the next day to selling that swept away all but a few points of the previous day's gains. Liquidation of March contracts before the first delivery notice day, February 23 in New Orleans and February 26 in New York, occupied traders' attention the remainder of the week. The disposal of March was not accompanied by the usual amount of switching to later months with the result that prices continued a slight but orderly decline to close the period at 12 points loss to one point gain as against the previous week. The possibility of inflationary legislation and that the Government might move to impound 5,000,000 bales of pool cotton from the market until the Fall of 1936 gave a steady tone in spite of the liquidation selling that was general.

Cotton Fabrics

Ducks, Drills, and Osnaburgs. During the past month the market has been progressively active; prices are distinctly firmer, and market tone definitely improved. Increasing difficulty of securing quick delivery for special constructions adapted to rubberizing is developing steadily. Cotton mill production appears to be under substantially full engagement for the first quarter. In fact many shrewd customers have covered practically their entire needs of special constructions for the first half of 1935.

Raincoat Fabrics. Spring raincoat business has just started. The present time is too early to state what cloth will prove the most popular goods next season.

Sheetings. For the past six weeks buying has been intermittent and of small volume. Apparently buyers were unwilling to enter into commitments previous to the decision by the Supreme Court on the gold clause cases. Now that that has been announced, considerable buying of grey goods is expected to be done before the close of the usual seasonal first quarter.

Tire Fabrics. Demand is moderate and seasonal; while prices continue steady and unchanged.

Tire Factory for Rio

An agreement has been entered into between Cia. Brasileira de Artefactos de Borracha, a small manufacturer of tires and tubes under trade name of "Caballi," and the Seiberling Rubber Co., Akron, O. The tire to be manufactured will be called "Brazil," with Seiberling tread designs.

WEEKLY AVERAGE PRICES OF MIDDLING COTTON

Week Ended	Cents per Pound
Feb. 2	12.56
Feb. 9	12.56
Feb. 16	12.59
Feb. 23	12.66

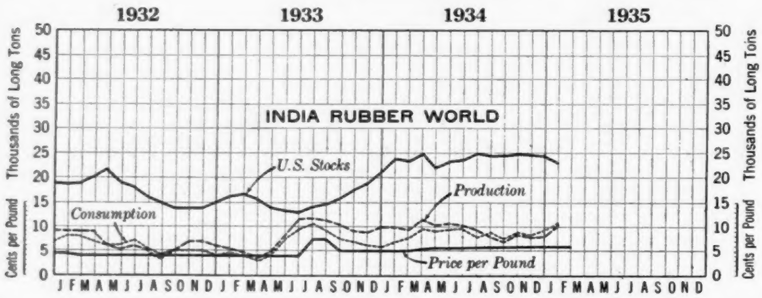
New York Quotations

February 23, 1935

Drills		
38-inch 2.00-yard	*yd.*	$0.16
40-inch 3.47-yard		.09⅜
50-inch 1.52-yard		.21¼
52-inch 1.85-yard		.17¾
52-inch 1.90-yard		.16½
52-inch 2.20-yard		.14¾
52-inch 2.50-yard		.13
59-inch 1.85-yard		.17
Ducks		
38-inch 2.00-yard D. F.	*yd.*	.15½/.16
40-inch 1.45-yard S. F.		.22¼
51½-inch 1.35-yard D. F.		.22¼
72-inch 1.05-yard D. F.		.29½/.31
72-inch 17.21-ounce		.35½
MECHANICALS		
Hose and belting	*lb.*	.34½
TENNIS		
52-inch 1.35-yard	*yd.*	.23¼
***Hollands**		
GOLD SEAL		
30-inch No. 72	*yd.*	.19½
40-inch No. 72		.20½
RED SEAL		
30-inch	*yd.*	.17
40-inch		.18
50-inch		.23½
Osnaburgs		
40-inch 2.34-yard	*yd.*	.12¼/.13½
40-inch 2.48-yard		.11⅝
40-inch 2.56-yard		.11¼
40-inch 3.00-yard		.10⅜
40-inch 10-ounce part waste		.15
37-inch 2.42-yard		.13¼
Raincoat Fabrics		
COTTON		
Bombazine 60 x 64	*yd.*	.09½
Plaids 60 x 48		.11½
Surface prints 60 x 64		.12¾
Print cloth, 38½-inch, 60 x 64		.06½
SHEETINGS, 40-INCH		
48 x 48, 2.50-yard	*yd.*	.11
64 x 68, 3.15-yard		.10
56 x 60, 3.60-yard		.08⅝
44 x 48, 3.75-yard		.07⅛
SHEETINGS, 36-INCH		
48 x 48, 5.00-yard	*yd.*	.06⅛
44 x 40, 6.15-yard		.05⅛
Tire Fabrics		
BUILDER		
17¼ ounce 60" 23/11 ply Karded peeler	*lb.*	.39
CHAFER		
14 ounce 60" 20/8 ply Karded peeler	*lb.*	.39
9¼ ounce 60" 10/2 ply Karded peeler	*lb.*	.39
CORD FABRICS		
23/5/3 Karded peeler, 1 1/16" cotton	*lb.*	.39
15/3/3 Karded peeler, 1 1/16" cotton	*lb.*	.37
23/5/3 Karded peeler, 1¼" cotton	*lb.*	.46
23/5/3 Combed Egyptian	*lb.*	.53
LENO BREAKER		
8¼ ounce and 10¼ ounce 60" Karded peeler	*lb.*	.34

*For less than 1,000 yards of a width add 10% to given prices.

RECLAIMED RUBBER



Production, Consumption, Stocks, and Price of Tire Reclaim

United States Reclaimed Rubber Statistics—Long Tons

Year	Production	Consumption	Consumption Per Cent to Crude	United States Stocks*	Exports
1931	132,462	125,001	35.7	19,257	6,971
1932	75,656	77,500	23.3	21,714	3,536
1933	99,974	81,612	20.1	20,746	3,583
1934					
January	9,828	7,000	17.3	24,303	333
February	9,504	7,646	18.8	23,356	282
March	11,479	9,683	20.3	25,113	354
April	10,185	9,387	20.9	22,033	394
May	10,848	9,500	22.1	22,887	559
June	10,820	9,459	23.5	23,664	444
July	9,446	8,175	25.0	24,926	669
August	8,160	8,493	25.5	24,607	410
September	6,974	7,024	23.1	24,540	307
October	8,145	8,171	26.1	24,511	356
November	7,268	7,775	22.3	23.999	419
December	7,353	8,284	22.6	23,079	210
1935					
January	10,465	11,261	23.9	22,291	....

*Stocks on hand the last of the month or year.
Compiled by The Rubber Manufacturers Association, Inc.

THE marked increase in output in the automotive industry has greatly stimulated the production of tires and the many other automotive rubber supplies, many of which utilize reclaimed rubber. The magnitude of this effect was very marked in January when consumption of reclaim reached 11,261 long tons compared to 8,284 long tons in December, 1934.

Prices on all grades are quoted unchanged from last month. The fact that high-grade tire and tube reclaims, for example, hold so steadily at low volume cost gives them great value as reliable stabilizers of price, as well as technical quality, when it is considered that these reclaims can be purchased for delivery for future needs at current nominal quotations.

New York Quotations

February 23, 1935

	Spec. Grav.	Cents per lb.
High Tensile		
Super-reclaim, black	1.20	8¾/9
red	1.20	7 /7¼
Auto Tire		
Black	1.21	5 /5¼
Black selected tires	1.18	5¼/5½
Dark gray	1.35	6¼/6½
White	1.40	9¼/9½
Shoe		
Unwashed	1.60	6½/6¾
Washed	1.50	8 /9
Tube		
No. 1	1.00	13 /
No. 2	1.10	7½/7¾
Truck Tire		
Truck tire, heavy gravity	1.55	5½/6
Truck tire, light gravity	1.40	6 /6¼
Miscellaneous		
Mechanical blends	1.60	4¾/4⅞

World Rubber Absorption—Net Imports

	Long Tons—1934		
CONSUMPTION	Oct.	Nov.	Dec.
United States	32,052	35,234	37,074
United Kingdom	10,929	9,007	8,777
NET IMPORTS			
Australia	798	516	304
Austria	187	446	...
Belgium	693	379	...
Canada	3,043	1,568	2,849
Czechoslovakia	254	215	762
Denmark	188	250	282
Finland	86	176	102
France	3,424	3,176	3,605
Germany	2,148	3,425	5,207
Italy	1,296	1,764	...
Japan	7,227	5,580	...
Netherlands	447	187	139
Norway	40	86	72
Russia	3,681	*4,000	...
Spain	675	*650	...
Sweden	499	870	687
Switzerland	181	159	...
Others	2,250	2,250	2,250
Totals	70,098	69,938	...
Minus U. S. (Cons.)	32,052	35,234	37,074
Total Foreign	38,046	34,704	...

*Estimate to complete table.
Compiled by Leather and Rubber Division, Department of Commerce, Washington, D. C.

RUBBER SCRAP

THE market for rubber scrap during February was somewhat active, with prices tending to firm slightly.

BOOTS AND SHOES. These grades continued in good demand, with collections slow.

INNER TUBES. A very good demand on all grades is maintained on stock both for export and for domestic consumption. Prices are somewhat firmer than they were a month ago. Red tubes have advanced ⅛¢ a pound.

TIRES. Supplies are limited and very difficult to obtain in some cases because of the small returns to shippers and the hardships of collection due to snow and severe cold weather.

SOLID TIRES. Domestic and export demand improved in the past thirty days; while supplies remain restricted and diminishing.

MECHANICALS. The demand is running very well at large volume. This condition is due apparently to the improved requirement of the automotive industry for many accessory rubber parts into the manufacture of which reclaim enters as an important component. Red and white grades of mechanical scrap have advanced somewhat over corresponding prices a month ago.

HARD RUBBER. Prices are very steady by reason of the limited supply which demand exceeds.

CONSUMERS' BUYING PRICES

(Carload Lots Delivered Eastern Mills)

February 23, 1935

		Prices
Boots and Shoes		
Boots and shoes, black	lb.	$0.01⅛/$0.01¼
Colored	lb.	.00¾/ .00⅞
Untrimmed arctics	lb.	.00¾/ .00⅞
Inner Tubes		
No. 1, floating	lb.	.07 / .07¼
No. 2, compound	lb.	.03⅛/ .03¼
Red	lb.	.02½/ .02⅝
Mixed tubes	lb.	.02⅝/ .03
Tires (Akron District)		
Pneumatic Standard		
Mixed auto tires with beads	ton	9.00 / 9.50
Beadless	ton	16.50 /17.00
Auto tire carcass	ton	10.00 /10.50
Black auto peelings	ton	19.00 /20.00
Solid		
Clean mixed truck	ton	38.50 /40.00
Light gravity	ton	42.00 /43.00
Mechanicals		
Mixed black scrap	ton	15.00 /17.00
Hose, air brake	ton	14.00 /15.00
Garden, rubber covered	ton	13.00 /13.50
Steam and water, soft	ton	13.00 /13.50
No. 1 red	lb.	.02¼/ .02⅜
No. 2 red	lb.	.01½/ .01¾
White druggists' sundries	lb.	.02¾/ .03
Mechanical	lb.	.02 / .02½
Hard Rubber		
No. 1 hard rubber	lb.	.11⅛/ .11½

Trade Marks

(*Continued from page 68*)

holders and garment bands. F. G. Montabert Co., Inc., New York, N. Y.

320,967. Word: **"Burbank"** written horizontally and vertically. Golf balls. W. C. Burbank, New York, N. Y.

321,080. **Tricouni.** Sport goods including tennis balls. Tricouni S. A., Geneva, Switzerland.

321,097. **Wiz-bac.** Combination undergarment. Model Brassiere Co., Inc., Brooklyn, N. Y.

321,108. **Gold Medal.** Tires. S & M Tire Co., Minneapolis, Minn.

321,228. **Dubltite.** Pneumatic tube valve stems. A. Schrader's Son, Inc., Brooklyn, N. Y.

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
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Allow nine words for keyed address. *Replies forwarded without charge.*

SITUATIONS WANTED

THE ADVERTISER, WELL KNOWN TO THE RUBBER AND allied trades from his engineering connection with the two largest makers of equipment for them, offers his services in advisory or any other capacity for which his experience has fitted him. Address H. G. Brewster, Derby, Conn.

CHEMICAL ENGINEER: SIX YEARS' APPLICATIONS latex to textiles, millboards, and beater processes. All phases synthetic resins. Complete experience in developing, manufacturing, and testing brake linings, clutch facings, and automotive accessories. Highest personal and technical references. Address Box 603, Middletown, Conn.

CHEMIST WITH FIVE YEARS' EXPERIENCE IN RUBBER WORK and nine years in other lines of chemistry would like to connect with concern making rubber goods, compounding materials, or related products. Address Box No. 471, care of INDIA RUBBER WORLD.

MAN WITH 25 YEARS' EXPERIENCE IN THE SALE OF MECHANical rubber goods, automotive specialties, molded goods and plumbers' specialties, would like to represent factory in Cleveland and Ohio territory. Address Box No. 472, care of INDIA RUBBER WORLD.

RUBBER CHEMIST, 15 YEARS' EXPERIENCE IN COMPOUNDing, process and factory control, general manufacturing and construction problems in tires, mechanicals, rubber to metal adhesion work, production and cost methods. Address Box No. 473, care of INDIA RUBBER WORLD.

SITUATIONS WANTED—Continued

SUPERINTENDENT: 10 YEARS' EXPERIENCE MANUFACTURING mechanicals, molded goods, gloves, hard rubber. Thorough knowledge of compounding. Familiar with production management. College man. Employed. Address Box No. 474, care of INDIA RUBBER WORLD.

POSITION WANTED BY PRACTICAL SUPERINTENDENT, NOW employed, in mechanical rubber manufacturing plant. Understand methods, processes, motion and time study, piece work setting. Address Box No. 476, care of INDIA RUBBER WORLD.

SITUATION OPEN

FOREMAN FOR HYDRAULIC PRESS ROOM, FAMILIAR WITH miscellaneous molded articles and molded mechanical rubber goods. Location, western New York state. Address Box No. 470, care of INDIA RUBBER WORLD.

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Rubber Expert and Tire Technician for Product and Plant

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67, Norwich Union Chambers, Birmingham, 3, England

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(SOLID OR GRANULATED)

A hard, stable compound—produced under the exacting supervision of an experienced and up-to-date laboratory.

Aging tests have proved Genasco to be *always* of uniform quality.

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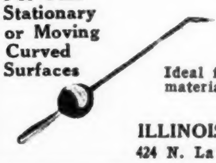

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A. Schulman Inc.

Warehouses in Both Cities

Branch Office: 576 No. 20th Street EAST ST. LOUIS, ILL.

(*Advertisements continued on page* 81)

Editor's Book Table

NEW PUBLICATIONS

"Calcene Data Sheets V." The Columbia Alkali Corp., Barberton, O. This comprises a series of curves and tables showing tensile properties results obtained in further work on Calcene as a compounding ingredient in various types of rubber stocks: namely, inner tubes, tire treads, and general purpose tubing.

"Statistical Bulletin of the International Rubber Regulation Committee." Brettenham House, 5-6 Lancaster Place, Strand, London, W.C.2, England. Vol. 1, No. 1, January, 1935. This monthly publication, issued by the International Rubber Regulation Committee, is an attempt to give all the principal available statistics regarding rubber in compact form. The Committee has decided to make the Bulletin available to the public at a reasonable price. Copies are obtainable at one shilling each. Annual subscription (calendar year only) ten shillings.

The Vanderbilt News. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. The January-February, 1935, issue of this publication is wholly devoted to Age-Rite HP, the most recent of the Age-Rite group of antioxidants. Its properties and functions are fully described and tabulated for comparison with those of the other members of the group. Test data are reported showing its particular value in protecting against flex-cracking in rubber articles subject to flexing and high temperature such as tire treads, frictions, black shoe uppers, no-mark soles, low-sulphur tubes, heat resisting packing, truck tubes, etc.

"Automatic Timing." Walser Automatic Timer Co., Chrysler Building, New York, N. Y. The automatic clock operated electrical timing devices illustrated and described are designed as time controls on rubber machinery, also for industrial, domestic, and other purposes.

"Synthetic Organic Chemicals." Sixth Edition, August 15, 1934. Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York, N. Y. This booklet describes the chemical products of this company. The data given are intended to outline some of their applications and so to present the important characteristics of the products that new uses will be suggested. The products are grouped by families such as alcohols, acids, ethers, ketones, etc. There are 11 of these embracing over 70 chemicals. A new feature of this issue is a solubility table giving the solvent power of 42 solvents for about a dozen industrially important oils and resins such as shellac, nitrocellulose, cellulose acetate, ester gum, etc.

"Thiokol Oil Proof Synthetic Rubber." Thiokol Corp., Yardville, N. J. This six-page folder describes the properties of the A, B, and C varieties of the oil proof material Thiokol.

BOOK REVIEWS

"Industrial Fabrics. A Handbook for Engineers, Purchasing Agents and Salesmen." By George B. Haven, S.B. First Edition. Published by Wellington Sears Co., 65 Worth St., New York, N. Y. 1934. Flexible leather. Gilt edges. 538 pages, 5¼ by 7¾ inches, 159 illustrations, 52 tables. Indexed. Price $2.

This handbook of industrial fabrics represents a selection of material based on an experience acquired over a period of nearly a century. It is offered as contribution to the progress of cotton textiles in serving the needs of American industry. Prof. George B. Haven, editor-in-chief, is in charge of textile research at the Massachusetts Institute of Technology and is author of the textbook "Mechanical Fabrics." His long experience in textile engineering and scientific approach to industrial problems identify him as a leading authority in the technology of textiles.

The book comprises 7 chapters as follows: Types of Cotton; Manufacturing Processes for the Cotton Fiber; Cotton Yarn; Uses of Industrial Fabrics; Organization and Properties of Industrial Fabrics; Laboratory Design and Practice; Specifications and Test Methods.

The arrangement and completeness of the information in text and tables will appeal to those interested in data on the industrial uses, specification, and testing of every variety of cotton fabric and yarns. To those engaged in the manufacture of rubber goods in which cotton is an important structural factor this book will prove an indispensable source of data on mechanical fabric specialties.

"Proceedings of the Thirty-seventh Annual Meeting." Held at Atlantic City, N. J., June 25-29, 1934. Vol. 34. American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa. Cloth. Illustrated. Subject and author indices. Part I, 1,325 pages; Part II, 943 pages.

Part I is devoted to Committee Reports, New and Revised Tentative Standards, and Tentative Revision of Standards. New material of interest to rubber technologists will be found in the reports of Committee D-11 on Rubber Products, Committee D-13 on Textile Materials, and Committee D-9 on Electrical Insulating Materials. Two tentative methods of rubber testing are presented, D394-34T Test for Abrasive Resistance of Rubber Compounds, and D395-34T Test for Compression Set of Vulcanized Rubber.

Part II comprises the technical papers given at the thirty-seventh annual meeting of the society. Among these papers are three relating to rubber as follows: "The Testing of Rubber and Rubber-like Materials for Oil Resistance," O. M. Hayden, Discussion; "The Testing of Raw Materials for Rubber Compounding," B. S. Taylor; "Materials for Use in Structural Engineering Models, with Special Reference to Rubber Compounds," A. V. Karpov, Discussion.

Rubber Bibliography

(*Continued from page* 50)

Manufacture of Rubberized Fabrics. *Caoutchouc & gutta-percha,* Jan. 15, 1935, pp. 17017-19. (Conclusion.)

Effect of the Capillary Activity of Certain Substances and Electrolytes on the Crystallization of Sulphur Out of Rubber Solutions. B. Dogadkin and J. Margolina, *Kautschuk,* Jan., 1935, pp. 7-11.

Revolution of the Rubber Industry. A Contribution to the History of the Direct Use of Latex. E. A. Hauser, *Kautschuk,* Jan., 1935, pp. 12-16. (From a French pamphlet by L. Morisse, published in 1908.)

The Rational Compounding of Ebonite Stocks. B. L. Davies, *India Rubber J.,* Jan. 12, 1935, pp. 51-54.

Thixotropy and Plasticity in the Rubber Industry. Prof. Freundlich, *India Rubber J.,* Jan. 19, 1935, pp. 81-82.

Special Properties of Latex. F. H. Cotton, *India Rubber J.,* Jan. 26, 1935, pp. 109-13.

Classified Advertisements
Continued

BUSINESS OPPORTUNITIES

WANTED: FORMULAE FOR COMPOUNDING OF PINK DENTAL rubbers. Address Box No. 477, care of INDIA RUBBER WORLD.

MACHINERY AND SUPPLIES FOR SALE

FOR SALE: THREE BIRMINGHAM 72" MIXING MILLS; FOUR 82" Mixing Mills; one 2-roll Calender 14 by 14" belted to motor; three Devine Vulcanizers, 5' by 11' long; one 18 by 54" Birmingham 4-roll Calender; one unused 18 by 30" heavy duty FARREL MILL, chain drive; complete line of W. & P. Mixers, Vacuum Shelf Driers, Calenders, Mills, Colloid Mills, Pebble Mills, Dough Mixers, Hydraulic Presses, Pumps, etc. Rebuilt, guaranteed. What machinery have you for sale? CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York, N. Y.

FOR SALE: 3 ROYLE No. 4 STRAINERS; 1 ADAMSON 42" by 120" hydraulic press; 2 American Process automatic continuous screw presses; 6 Southwark 1" by 4" hydraulic pumps; vacuum shelf driers; W. & P. mixers; etc. ATTRACTIVELY PRICED! Send us a list of your surplus equipment. STEIN-BRILL CORPORATION, 183 Varick Street, New York, N. Y.

(*Advertisements continued on page* 83)

Softened Rubber

(*Continued from page 42*)

made from softened rubber; experiments conducted in several laboratories show that the rate of water absorption is considerably lowered and also that the ultimate absorption is less than 50% of what it was before softened rubber was used in the compounds involved. This appears to be due to the step of comminuting the rubber under water prior to actual processing and to the consequential elimination of some ionizable bodies of the nonrubbers present. During the vacuum treatment a slight evaporation of products favoring water absorption also takes place.

Perhaps the most striking alteration to rubber technique is the practical elimination of processing softeners in mixes using softened rubber. When softeners used mainly to facilitate mixing and subsequent operations prior to vulcanization have no really beneficial effect on the finished product, they can be entirely dispensed with where softened rubber is used. These softeners have many drawbacks: some exude or migrate in the finished goods; others cause the products to be too soft at high atmospheric temperatures and too hard at low temperatures, thereby decreasing their range of usefulness. Most of the softeners, after vulcanization, have no elasticity of their own, and their presence affects the principal property of rubber. Such is not the case with softened rubber; it acts as a softener prior to vulcanization and after it contributes its own elasticity leaving nothing of an undesirable nature in the vulcanized products.

Compounded softened rubber has a very good flow during the first stage of vulcanization, its advantages are quite obvious in intricate moldings and in hard rubber. For the latter industry this property, coupled with the entire elimination of the breaking down, softened rubber should be a much welcomed development.

Rubber reenforcing agents and fillers disperse or mix very readily into softened rubber, this material wetting them better than ordinary masticated rubber. It also permits slightly higher volume loadings; for instance, a master batch of equal parts of softened rubber and carbon black can be easily produced without any addition of softeners.

Experiments under way give a strong indication of an increase in elementary forces binding rubber and carbon black, resulting in better abrasion resistance.

Viscosities of cements for the same dry solid content are much lower; consequently, if for a given case present viscosities are to be retained, a higher solid content can be used, and a saving in solvents effected. There is practically no evolution of plasticity in softened rubber; by the same token there is little or no evolution in the viscosity of cements made wholly from uncompounded softened rubber. The time and power required to mix cements or doughs from softened rubber are but a fraction of the time and power needed to mix the same cements from ordinary crude rubber.

Humane Police Club. Soft pliable rubber is molded in the conventional form of a police club having a longitudinal bore extending from its larger end to a point near its smaller end. In that end a metal tube is embedded having openings at opposite sides, which openings communicate with the longitudinal bore of the club. Thus the club has a metal reenforced rubber grip portion and a pliable striking end which will not damage a person struck by it as though he were struck by a club of hard wood.

Rubber Goods Production Statistics

		1934 Nov.	1933 Nov.
Tires and Tubes*			
Pneumatic casings			
Production	*thousands*	3,241	2,432
Shipments, total	*thousands*	3,095	1,758
Domestic	*thousands*	3,026	1,686
Stocks, end of month	*thousands*	8,516	7,397
Solid and cushion tires			
Production	*thousands*	16	11
Shipments, total	*thousands*	17	9
Domestic	*thousands*	16	8
Stocks, end of month	*thousands*	33	28
Inner tubes			
Production	*thousands*	3,074	2,290
Shipments, total	*thousands*	2,684	1,682
Domestic	*thousands*	2,630	1,636
Stocks, end of month	*thousands*	8,247	6,900
Raw material consumed			
Fabrics	*thous. of lbs.*	15,382	10,447
Miscellaneous Products			
Rubber bands, shipments	*thous. of lbs.*	...	185
Rubber clothing, calendered			
Orders, net	*no. of coats and sundries*	22,756	14,878
Production	*no. of coats and sundries*	25,868	38,342
Rubber-proofed fabrics, production, total	*thous. of yds.*	...	2,458
Auto fabrics	*thous. of yds.*	...	318
Raincoat fabrics	*thous. of yds.*	1,552	1,165
Rubber flooring, shipments	*thous. of sq. ft.*	440	268
Rubber and canvas footwear			
Production, total	*thous. of prs.*	4,992	6,752
Tennis	*thous. of prs.*	1,165	2,071
Waterproof	*thous. of prs.*	3,827	4,682
Shipments, total	*thous. of prs.*	4,727	6,289
Tennis	*thous. of prs.*	575	837
Waterproof	*thous. of prs.*	4,152	5,452
Shipments, domestic, total	*thous. of prs.*	4,653	6,209
Tennis	*thous. of prs.*	528	779
Waterproof	*thous. of prs.*	4,125	5,430
Stocks, total, end of month	*thous. of prs.*	15,513	14,858
Tennis	*thous. of prs.*	6,675	6,721
Waterproof	*thous. of prs.*	8,838	8,137
Rubber heels			
Production	*thous. of prs.*	13,922	15,955
Shipments, total	*thous. of prs.*	15,746	11,287
Export	*thous. of prs.*	326	337
Repair trade	*thous. of prs.*	4,175	4,552
Shoe manufactures	*thous. of prs.*	11,244	6,398
Stocks, end of month	*thous. of prs.*	38,040	38,436
Rubber soles			
Production	*thous. of prs.*	3,541	4,054
Shipments, total	*thous. of prs.*	3,617	2,763
Export	*thous. of prs.*	3	2
Repair trade	*thous. of prs.*	585	409
Shoe manufactures	*thous. of prs.*	3,030	2,531
Stocks, end of month	*thous. of prs.*	4,528	5,559
Mechanical rubber goods, shipments			
Total	*thous. of dollars*	3,094	2,836
Belting	*thous. of dollars*	707	607
Hose	*thous. of dollars*	1,078	1,013
Other	*thous. of dollars*	1,310	1,216

*Data for 1934 are estimated to represent approximately 97% of the industry.

Source: *Survey of Current Business,* Bureau of Foreign & Domestic Commerce, Washington, D. C.

World Rubber Shipments—Net Exports

	Long Tons 1934 Oct.	1934 Nov.	1934 Dec.	1935 Jan.
British Malaya				
Gross exports	47,045	51,140	59,575	56,720
Imports	10,226	8,759	15,375	17,142
Net	36,819	42,381	44,200	39,578
Ceylon	6,544	6,756	9,441	6,268
India and Burma	413	501	990	*800
Sarawak	1,412	953	1,237	1,630
British N. Borneo	1,196	941	680	*700
Siam	1,328	1,356	2,043	2,614
Java and Madura	5,970	7,621	10,865	....
Sumatra E. Coast	6,643	7,123	12,953	....
Other N. E. Indies	5,556	5,338	12,354	....
French Indo-China	*1,413	*2,356	*2,956	2,650
Amazon Valley	840	1,017	1,035	*1,000
Other America	...	...	...	...
Guayule (Mexico)	...	...	...	...
Africa	401	334	*300	*300
Totals	68,535	76,677	99,054	51,540

*Estimate. *Compiled by Leather and Rubber Division, Department of Commerce, Washington, D. C.*

Low and High New York Spot Prices

All prices in cents per pound.

	February 1935*	February 1934	February 1933
Plantations			
No. 1 thin latex crepe	13 /13¾	11¼/12¼	3⅝/3 11/16
No. 1 ribbed smoked sheet	12⅝/13⅜	9 11/16/10¾	2⅞/3
Paras			
Upriver fine	9½/ 9¾	9 / 9¾	6 /...

Figured to February 23, 1935.

Classified Advertisements

Continued

MACHINERY AND SUPPLIES WANTED

WANTED: WE NEED SOME BALL MOLDS, EITHER OF STEEL or aluminum. Assorted sizes from 1¼-inch balls to 3-inch. Address Box No. 469, care of INDIA RUBBER WORLD.

WANTED: SMALL-SIZE STEAM JACKETED DIgester with stirrer, good for 200-300 lbs. steam pressure, size about 3 ft. by 5 ft. or smaller. Address Box No. 475, care of INDIA RUBBER WORLD.

MISCELLANEOUS

WE WILL PAY 25¢ EACH FOR PERFECT COPIES OF THE FOLlowing numbers of INDIA RUBBER WORLD: June, August, September, October, all 1934. INDIA RUBBER WORLD, 420 Lexington Ave., New York, N. Y.

Rubber Questionnaire

Third Quarter, 1934*

	Long Tons			
Reclaimed Rubber	Inventory at End of Quarter	Production	Shipments	Consumption
Reclaimers solely (5)	5,107	10,077	8,916	....
Manufacturers who also reclaim (28)	6,495	15,013	6,954	8,544
Other manufacturers (118)	13,955	....	....	10,850
Totals	25,557	25,090	15,870	19,394

	Long Tons		
Scrap Rubber	Inventory	Consumption	Due on Contract
Reclaimers solely (5)	35,229	11,628	14,020
Manufacturers who also reclaim (18)	67,406	16,065	13,051
Other manufacturers (25)	371	.....	19
Totals	103,006	27,693	27,090

Tons of Rubber Consumed in Rubber Products and Total Sales Value of Shipments

Products	Crude Rubber Consumed Long Tons	Total Sales Value of Shipments of Manufactured Rubber Products
Tires and Tire Sundries		
All types pneumatic casings (except bicycle, airplane)	56,003	$67,679,000
All types pneumatic tubes (except bicycle, airplane)	9,835	9,817,000
Bicycle tires, including juvenile pneumatics (single tubes, casings, and tubes)	511	924,000
Airplane tires and tubes	31	54,000
Solid and cushion tires for highway transportation	344	481,000
All other solid and cushion tires	91	234,000
Tire sundries and repair materials	1,888	3,169,000
Totals	68,703	$82,358,000
Other Rubber Products		
Mechanical rubber goods	6,849	$20,405,000
Boots and shoes	4,475	14,451,000
Insulated wire and cable compounds	884	†
Druggists' sundries, medical and surgical rubber goods	702	2,071,000
Stationers' rubber goods	344	428,000
Bathing apparel	272	232,000
Miscellaneous rubber sundries	714	1,687,000
Rubber clothing	281	954,000
Automobile fabrics	345	1,303,000
Other rubberized fabrics	1,115	3,202,000
Hard rubber goods	550	2,609,000
Heels and soles	2,746	3,904,000
Rubber flooring	200	320,000
Sponge rubber	320	388,000
Sporting goods, toys, and novelties	441	1,773,000
Totals	20,238	$53,727,000
Grand totals—all products	88,941	$136,085,000

Inventory of Rubber in the United States and Afloat

	Long Tons	
	Crude Rubber on Hand	Crude Rubber Afloat
Manufacturers	222,522	9,655
Importers and dealers	80,951	29,329
Totals	303,473	38,984

*Number of rubber manufacturers that reported data was 252; crude rubber importers and dealers, 43; reclaimers (solely), 5; total daily average number of employes on basis of third week of July was 146,943.

It is estimated that the reported grand total crude rubber consumption is 92.3%; grand total sales value, 95%; the grand total crude rubber inventory, 84.4%; afloat figures unavailable; the reclaimed rubber production, 100%; reclaimed consumption, 81.9%; and reclaimed invenfory, 95.8% of the total of the entire industry.

†Due to the difficulty of securing representative sales figures this item is discontinued for 1934.

Compiled from statistics supplied by The Rubber Manufacturers Association, Inc.

Imports by Customs Districts

	December, 1934 *Crude Rubber		December, 1933 *Crude Rubber	
	Pounds	Value	Pounds	Value
Massachusetts	5,085,365	$621,039	8,240,264	$583,706
Rochester	......	......	4,654	862
New York	22,921,402	2,929,276	67,408,984	4,617,869
Philadelphia	1,150,582	147,740	5,177,603	297,124
Maryland	3,311,753	435,047	6,337,664	393,153
Mobile	244,217	27,554	......	......
New Orleans	1,774,328	228,371	420,071	17,271
Los Angeles	5,948,182	737,010	3,467,344	213,206
San Francisco	130,180	18,115	208,888	15,917
Oregon	......	......	14,784	739
Ohio	137,471	14,810	2,500	242
Totals	40,703,480	$5,158,962	91,282,756	$6,140,089

*Crude rubber including latex dry rubber content.

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	December, 1934		Twelve Months Ended December, 1934	
Unmanufactured—*Free*	Pounds	Value	Pounds	Value
Crude rubber	39,402,247	$4,974,374	1,006,480,550	$97,898,519
Liquid latex	1,301,233	184,588	29,276,134	3,633,253
Jelutong or pontianak	429,671	31,947	11,171,369	943,752
Balata	13,077	2,458	2,360,915	438,209
Gutta percha	135,870	12,631	3,824,356	425,656
Guayule	......	......	891,700	75,349
Scrap and reclaimed, etc.	740,932	4,699	9,797,149	85,933
Totals	42,023,030	$5,210,697	1,063,802,173	$103,500,671
Chicle, crude ......*Free*	929,970	$187,002	6,498,601	$1,471,156
Manufactured—*Dutiable*				
Rubber soled footwear with fabric uppers ......*pairs*	89,887	$30,391	1,335,375	$328,548
Rubber toys	......	12,111	......	269,313
Druggists' sundries, n. e. s.	......	5,357	......	75,952
Combs, hard rubber.*number*	44,556	2,256	1,267,794	59,881
Golf balls ......*number*	1,452	296	457,490	111,007
Tennis and other rubber balls ......*number*	201,396	6,630	2,238,925	150,904
Tires ......*number*	1,540	1,082	11,210	20,057
Other rubber manufactures	......	31,342	......	474,250
Totals	......	$89,465	......	$1,489,912

Exports of Foreign Merchandise

Rubber and Manufactures	Pounds	Value	Pounds	Value
Crude rubber	1,940,855	$240,780	53,419,766	$5,770,109
Balata	4,512	1,447	157,237	46,311
Guayule	......	......	16,800	1,419
Gutta percha, rubber substitutes, and scrap	800	128	4,792	1,173
Rubber manufactures	......	372	......	18,170
Totals	......	$242,727	......	$5,837,182

Exports of Domestic Merchandise

Rubber and Manufactures	Pounds	Value	Pounds	Value
Reclaimed	469,518	$24,944	10,508,588	$492,878
Scrap	7,453,266	164,352	51,498,409	1,078,374
Rubberized automobile cloth, *sq. yd.*	73,872	34,020	829,250	418,814
Other rubberized piece goods and hospital sheetings.*sq. yd.*	54,289	24,763	778,305	342,420
Footwear				
Boots ......*pairs*	5,348	12,480	56,456	137,299
Shoes ......*pairs*	28,016	24,388	218,654	116,624
Canvas shoes with rubber soles ......*pairs*	15,017	10,643	263,851	166,570
Soles ......*doz. pairs*	2,053	4,016	35,260	58,141
Heels ......*doz. pairs*	35,865	17,084	384,888	204,292
Water bottles and fountain syringes ......*number*	12,875	5,182	222,008	84,934
Gloves ......*doz. pairs*	6,459	15,196	59,121	128,806
Other druggists' sundries	......	25,440	......	357,830
Balloons ......*gross*	34,756	24,436	248,564	220,238
Toys and balls	......	6,828	......	65,875
Bathing caps ......*doz.*	1,874	3,428	92,605	161,632
Bands	14,315	4,752	255,290	84,928
Erasers	21,038	11,846	332,210	184,506
Hard rubber goods				
Electrical goods	112,345	13,027	1,290,990	131,670
Other goods	......	13,882	......	151,403
Tires				
Truck and bus casings, *number*	22,036	371,617	309,898	4,941,869
Other automobile casings, *number*	39,755	300,274	801,298	5,572,535
Tubes, auto ......*number*	50,877	56,614	771,196	863,348
Other casings and tubes, *number*	2,800	6,832	47,840	126,678
Solid tires for automobiles and motor trucks.*number*	668	14,741	9,352	225,506
Other solid tires	92,204	11,821	1,456,874	182,609
Tire sundries and repair materials	......	29,240	......	381,427
Rubber and friction tape	33,012	9,372	549,532	147,532
Belting	156,266	75,477	2,438,295	1,143,278
Hose	306,931	104,659	4,347,832	1,247,503
Packing	94,545	35,024	1,099,694	442,352
Thread	76,818	45,167	1,120,701	670,036
Other rubber manufactures	......	100,125	......	1,232,236
Totals	......	$1,601,670	......	$21,764,143

London Stocks, December, 1934

			Stocks, December 31		
London	Landed Tons	Delivered Tons	1934 Tons	1933 Tons	1932 Tons
Plantation	8,052	3,423	72,228	35,597	37,358
Other grades	12	12	57	18	49
Liverpool					
Plantation	*3,968	*1,569	*62,505	*50,823	*55,160
Total tons, London and Liverpool	12,032	5,004	134,790	86,438	92,567

*Official returns from the recognized public warehouses.